Request for Renewal of
MATH 100: Survey of Mathematics
as an FS course

Leeward Community College
Fall 2007

MATH 100: Survey of Mathematics (3)
AA/FSC
3 hours of lecture per week.

Course Description

MATH 100 includes a variety of selected mathematical topics designed to acquaint students with examples of mathematical reasoning. The topics included in a given section or academic term are chosen by the instructor to demonstrate the beauty and power of mathematics from applied, symbolic, and abstract standpoints. MATH 100 is not intended as, and does not qualify as, a prerequisite for advanced mathematics courses.

Student Learning Outcomes

Upon successful completion of Math 100, students should be able to:

- model applied problems symbolically and perform manipulations on the symbols within an appropriately selected mathematical or logical formal system.
- distinguish between a rigorous proof and a conjecture.
- author an elementary proof.
- correctly select, then appropriately apply, formal rules or algorithms to solve numeric, symbolic, graphical, and/or applied problems.
- assess the reasonableness of, then appropriately communicate, the solutions to problems.

Changes

There have been no significant changes in the course itself but clarifying changes were made to the Curriculum Central Core Outline. These changes were effective with the fall 2007 semester.

Course description: MATH 100 was created almost exclusively for students wanting a terminal mathematics course to meet a UH-Manoa BA and LCC AA core requirement. At the time the originally-approved course description was written, this core requirement was called "Quantitative Reasoning." The new course description now reflects the current "Symbolic Reasoning" Foundation requirement.

SLOs: The originally-approved SLOs were written to correspond to the competencies associated with the core requirement titled "Mathematical/Logical Reasoning." The new SLOs were rewritten to recognize the FS hallmarks.

Assessment
Samples of course materials that illustrate how the course meets the Foundations Hallmarks.

Hallmark 1: Students will be exposed to the beauty, power, clarity and precision of formal systems.

During the discussions in the spring 2003 fast track mathematics working group and October, 2003 system-wide math course coordination meeting, Manoa mathematics faculty, including a member of the Manoa Foundations Board each time, affirmed that Math 100 should introduce students to the beauty and precision of mathematics but that the selection of individual topics for any particular Math 100 course should be left to the instructor.

In keeping with those guidelines, Math 100 instructors choose a range of mathematical topics to cover in an appropriate breadth and depth. Though the specific topics will vary from one instructor to another, some more abstract topics will be included to show the inherent beauty in mathematical systems and additional more applied topics, or applications of the abstract ones, will be selected to illustrate the power that mathematics has to solve problems.

As an example, one currently offered Math 100 course includes number theory (abstract), algebra (abstract and applied), geometry (abstract and applied), and statistics (applied). This particular course's selection of topics was examined carefully during the spring 2003 fast track articulation process, after which Leeward CC's Math 100 was approved unanimously by those in attendance (one Manoa faculty member was splitting his time between the Math 100 and Phil 110 discussions).

Sample materials:

In the televised Math 100 course, the topics covered include foundation materials, algebra and applications, and geometry.

In the foundation materials unit, logic and number systems are the focus. The number systems (from natural numbers to the reals) are introduced along with their properties. The insufficiency of the natural numbers, due to lack of closure under subtraction, is demonstrated and used as motivation for the creation of the set of integers. Similarly, since integers lack closure under non-zero division, the rational numbers are shown to be needed. The inability to take the square root of 2 shows the insufficiency of the rational numbers, and so the need for real numbers is demonstrated. That "larger" number systems with the arithmetic properties of the prior number systems along with new ones can be created shows both the beauty and power of mathematics.

In the algebra unit, equation-solving techniques introduced in prerequisite courses are reviewed and extended to include new techniques that allow solutions of larger classes of equations. This ability makes it possible to derive and use formulas that describe the behavior of deposit and loan accounts in the long term. Being able to use algebra to

derive compact closed forms for these formulas shows the beauty of mathematics. The ability to determine balances, deposits, payments, interest rates, and loan lengths with an infinite amount of variability clearly demonstrates the power of mathematics.

The focus of the geometry unit is on understanding of measurements as well as the relationships between two or more measurements. Showing how the formula for rectangles is motivated by the definition of a square unit then showing how other common formulas for polygonal areas are derived by comparison to rectangles shows the beauty of mathematics. The power of mathematics comes in using this knowledge to make correct decisions about what size of pizza to buy given the size and price differences.

In the statistics unit, students are called upon to generate their own data sets and determine statistical descriptions (frequencies, relative frequencies, mean, median, mode, and standard deviation) to describe their data sets to show how the terminology and concepts can be used in their own applied contexts.

Hallmark 2: Instructors will help students understand the concept of proof as a chain of inferences.

Instructors provide precise definitions, carefully worded theorems, and elementary proofs of theorems in addition to the aforementioned derivations of formulas. Those theorems whose proofs are beyond the scope of the class are at least discussed so that students understand that the conclusions they are seeing are the result of deductive reasoning. Instructors also have students read other proofs and assign problems that require students to author their own elementary proofs to reinforce the use of deductive reasoning in proving mathematical statements.

Sample materials:

In proving that the sum of any even integer and any odd integer is an odd integer, students are first given the definition of an even integer (a multiple of two). Then, from the definition comes the fact that any even integer has the symbolic representation $2x$, for some integer x. The observation that every odd integer is one less than an even gives rise to the fact that any odd integer has the symbolic representation $2y - 1$, for some integer y. Summing any even and any odd integer gives the symbolic representation $2x + 2y - 1 = 2(x + y) - 1$, which is the symbolic form of an odd integer. Thus, the student sees that the definitions and chain of subsequent inferences proves that the sum of any even integer and any odd integer must be an odd integer. The student is then called upon to author their own proofs of statements involving sums and products of odd and even integers.

Students are shown how the order property of real numbers proves that the product of two positive real numbers is positive. Then, the trichotomy and distributive properties prove that the product of one positive real number and one negative real number is negative. Finally, this result, along with the additive inverse property, proves that the product of two negative real numbers is positive. In each step, the nature of deductive reasoning is emphasized.

Hallmark 3. Instructors will teach students how to apply formal rules or algorithms.

The use of algorithms is a ubiquitous part of any mathematics course. This is true both in conceptual and abstract situations as well as in applied problems. Instructors emphasize the analytic processes used in selecting an appropriate rule or algorithm, applying it properly, and (where possible) checking the reasonableness or correctness of the conclusion or results obtained.

Sample materials:

Students are shown the root extraction method of solving an equation. First, the student must solve for the exponential expression. Then, the student must apply the root extraction process. Then, the student must solve for the variable. Finally, if the problem requires it, the student must obtain a decimal representation for the solution.

Students are also shown how to use logarithms to solve an equation. First, the student must solve for the exponential expression. Then, the student must take logarithms of both sides of the equation. Then, the student must simplify the logarithms by using the properties of logarithms (which were proven, not just given). Next, the student uses properties of equations to solve for the variable.

Further, students are assigned numerous homework and test questions that require correct application of the algorithms in these techniques.

In addition, students are required to distinguish between the methods when they are asked as a graded homework assignment, "Both root extraction (section 2.2) and logarithms (section 2.3) can be used to solve equations that contain exponential expressions. Describe in your own words how you would determine which of the techniques is appropriate for solving an equation that contains an exponential expression. (hint: re-read parts b and c of example 5 on page 114-115 of your textbook)."

Students are shown how to identify or calculate the mean, median, and mode of a quantitative data set. The mean is obtained by summing the data values then dividing by the number of values. The median is obtained by first ordering the data then identifying the middle value in the ordered list. If there is an even number of values and there are two middle values, the median is the midpoint of the two middle values. The mode is the data value that occurs the most frequently in the data set. If no such data value exists then there is no mode.

Further, students are assigned numerous homework and test problems that require use of these algorithms in order to identify or calculate the mean, median, and mode of the data sets contained in the problems.

Hallmark 4. Students will be required to use appropriate symbolic techniques in the context of problem solving, and in the presentation and critical evaluation of evidence.

Much of Math 100 focuses on modeling. These mathematical models by nature require the use of formal abstract systems to represent concrete situations. Students are expected to select, build, manipulate, simplify, and apply an appropriate symbolic model and/or the appropriate algorithm to fit the given situation then check the reasonableness and/or correctness of both the model used and the conclusion drawn.

Sample materials:

As shown under Hallmark 2, students must symbolize odd and even integers in order to prove a statement that involves "any" odd or even integer. This is particularly true since exhaustion cannot be used to prove a statement for such a set with infinitely many members.

As described in Hallmark 1, students must symbolize the various aspects of financial problems (initial loan or deposit amount, interest rate, etc.) in order to derive formulas that model their behavior.

After reviewing linear equations, which is covered in prerequisite courses, and introducing root extraction and logarithms, which are not covered in prerequisite courses, students use these methods to symbolically model then solve problems involving inflation.

After symbolically introducing geometric formulas involving circles, students use the models to make appropriate comparisons regarding the sizes, and respective dollar-values, of round pizzas of different sizes.

Hallmark 5. The course will not focus solely on computational skills.

As discussed in Hallmark 1, the actual skills and topics included in the course will appropriately vary somewhat from instructor to instructor; however, Math 100 always includes a variety of mathematical topics. The point to this breadth of coverage is to illustrate how mathematical reasoning in general can be applied to a variety of situations. This is a contrast to a course such as Math 73 (Algebraic Foundations I), which focuses specifically on algebraic techniques applied to expressions and equations with one variable.

Instructors stress logical thinking and reasoning in each of the chosen topics. Computations may be a necessary factor in some of the topics but when included, instructors will emphasize that the computational results play only a supporting role in the larger process of deductive reasoning.

Sample materials:

In the section covering sequential percent increases and decreases, the idea of front loading or back loading employment contracts is brought up. Students are assigned numerous problems involving percent raises over multiple years, as would be expected. Upon completion of such problems, the students are also assigned the following open-ended question in which the computations they just completed serve as background information: "Think of some additional advantages and disadvantages (to both parties involved) when employment contracts are front loaded and back loaded. Write a paper discussing the various advantages and disadvantages both in general terms and for your specific situation."

As described under Hallmark 1, financial formulas are derived and students are assigned problems in which they must evaluate them correctly to answer questions. After computing various savings account balances under different sets of conditions, students are asked for homework, "Compare the corresponding parts of problem 2 [the account balance computations] and comment on (write everything you see and can think of) the relative and related effects of increasing the time period, interest rate, and compounding frequency in compound interest accounts."

As described under Hallmark 1, financial formulas are derived. The installment savings formula is derived for monthly deposits. To test whether students understand the reasoning behind the derivation, students are assigned these problems:

"What change(s) would be needed in the installment savings formula if the deposits and compounding are biweekly (every other week for 26 times per year) rather than monthly?"

"What change(s) would be needed in the installment savings formula if the deposits and compounding are quarterly rather than monthly?"

Hallmark 6. Instructors will build a bridge from theory to practice and show students how to traverse this bridge.

In many topics, instructors use concrete examples to motivate the need for an abstract model. In other areas, an abstract, axiomatic model is introduced before examining examples. In both cases, after an abstract model is constructed and studied, instructors will select and demonstrate appropriate, relevant examples (mortgage and other financial calculations are popular and particularly relevant in Hawaii) to show how the model can be used to make meaningful and correct decisions.

Sample materials:

As described under Hallmark 1, financial formulas are derived in this course. These are an excellent example of a symbolic model being derived from a practical need since most students have experience with savings accounts or installment loans (auto loans and mortgages in particular). Appropriate mathematical techniques are used to derive formulas that model the situations. Then, instructors carefully show how the formulas can be used to understand real-world applications and make correct practical decisions. Specifically, after geometric sequences and series are used to derive the installment loan formula that can be used to calculate monthly mortgage payments, instructors show students how the formula can be applied to the real-life problem of comparing the monthly payments for 6% and 7% annual interest rates for a 30 year mortgage.

Another example that illustrates the interplay between theory and practice is unit conversions, which are covered at the beginning of the geometry unit. Most students are familiar with currency differences between the United States and other countries. This practical need gives rise to the unit conversion operation. Then, this operation can be used to convert the prices of various items that students see advertised by foreign companies on the web into U. S. dollars, which reinforces the practical need for the operation.

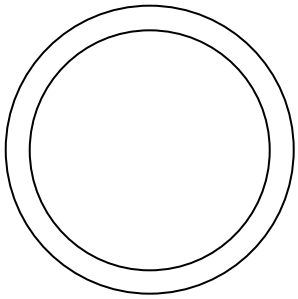
As first described in the hallmark 4 discussion, the abstract formulas that describe rectangles and circles are introduced in the course. Instructors then carefully show how the variables in the area formulas can be used to answer questions about pizzas, including problems that require higher levels of reasoning, as seen in this pair of examples that are demonstrated in class:

5. A pizza parlor offers two sizes of the same kind of pizza: a medium round pizza with a 12 inch diameter priced at \$11.49 and a large round pizza with a 14 inch diameter priced at \$15.49. Based on unit costs, is either size a noticeably better deal than the other?

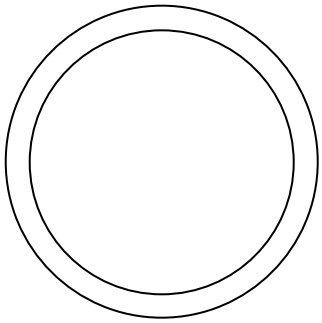
The area measurement of a 12 inch diameter (6 inch radius) circle is $\pi(6^2) \approx 113$ square inches. The area measurement of a 14 inch diameter (7 inch radius) circle is $\pi(7^2) \approx 154$ square inches. Hence, the unit cost for the medium pizza is $\frac{\$11.49}{113 \text{ sq in}} \approx \$0.1017$ per square inch and the unit cost for the large pizza is $\frac{\$15.49}{154 \text{ sq in}} \approx \$0.1006$ per square inch. Since these unit costs only differ

by around 1%, we conclude that for practical purposes, the unit costs are equal. Hence, neither size is a noticeably better deal than the other.

6. Using the pizza information from example 5, suppose that there is a one-inch ring of plain crust at the edge of each pizza that you will not eat. Does this affect your conclusion?



6 inch radius
5 inch "edible" radius



7 inch radius
6 inch "edible" radius

The "edible" area for the medium pizza is $\pi(5^2) \approx 78.5$ square inches and the "edible" area for the large pizza is $\pi(6^2) \approx 113$ square inches. Hence, the effective unit costs are $\frac{\$11.49}{87.5 \text{ sq in}} \approx \$0.1464$ per square inch for the medium pizza and $\frac{\$15.49}{113 \text{ sq in}} \approx \$0.1371$ per square inch for the large pizza. The larger pizza's unit cost is about 6% less than the medium pizza's unit cost, so the larger pizza is a somewhat better deal than the medium pizza.

Sample exams:

Exam 1:

1. Identify each sentence as a statement or not:
   a. Bus route #6 does not stop along Piikoi St.
   b. A McDonalds large coffee costs less than a Starbucks large coffee.
   c. You should drive in the middle lane of the freeway whenever possible.
2. Negate the quantifier in each statement.
   a. No dog drinks milk.
   b. Some credit cards offer airline mileage rewards.
3. List every non-trivial factorization of the natural number 48 that uses exactly two factors.
4. Determine the PRIME FACTORIZATION of the number 48.
5. Write out a deductive PROOF of the following statement: The sum of any two even integers must be an even integer.
6. Find the CROSS PRODUCTS to determine whether the fractions $\frac{239}{301}$ and $\frac{319}{401}$ are equivalent or not.
7. In each lettered part, write ONE fraction (NOT a mixed number) that has BOTH of the described properties.
   a. IMPROPER and NOT IN LOWEST TERMS
   b. PROPER and IN LOWEST TERMS.
8. a. Re-write the number 170,000,000,000 using scientific notation.
   b. Re-write the number 5.1×10^{-6} using decimal notation.
9. Re-write the repeating decimal 2.1295295295295… as an equivalent fraction. You must have integers in the numerator and denominator but you need not reduce your fraction.
10. Which ONE of the following equations demonstrates the DISTRIBUTIVE property?
    a. $2x + y = y + 2x$
    b. $3x^2 - 6yz = 3(x^2 - 2yz)$
    c. $(2x^2y)(5x^2y^2) = 10x^4y^3$

Exam 2:

1. Solve the linear equation: $3x - 2(1 - 7x) = -9$

2. Solve using root extraction. Express your solution as a decimal approximation with at least three decimal places.

$$x^5 = 555$$

3. Use a common or a natural logarithm to solve the equation. Express your solution as a decimal approximation with at least three decimal places.

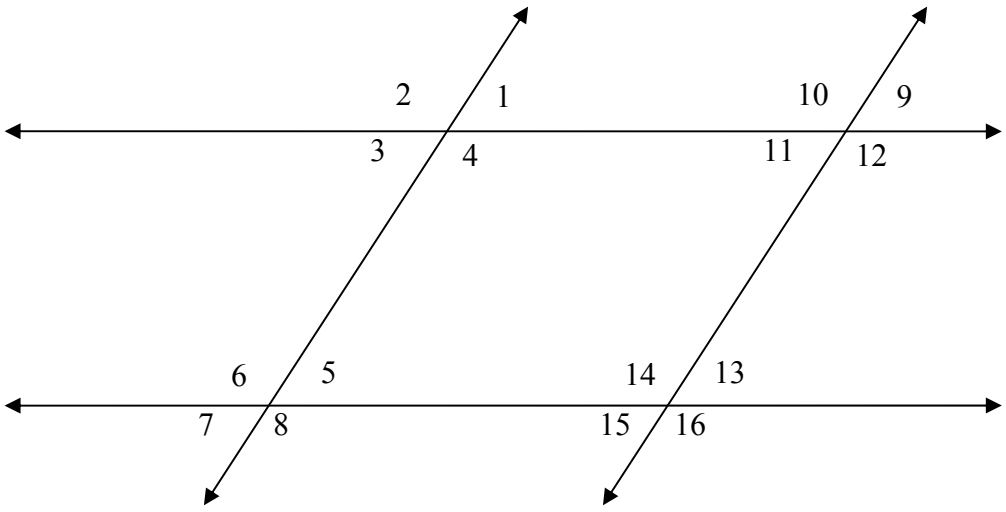
$$5^x = 555$$

4. (7 points) A diamond bracelet is regularly priced at $1,430. This week, such bracelets are on sale for 30% off of the regular price but there is an "extra discount" coupon that will give you another 20% off of the sale price.
   a. Calculate the final discounted price after both the sale and coupon discounts, and
   b. calculate the effective discount rate.

5. An assortment of household products cost $196 in 1990 and costs $339 in 2006. Use these values and the compound interest formula to estimate the annual inflation rate over the 16 years.
6. (8 points) Suppose you start depositing $125 each month into an account paying 5.5% annual interest, compounded monthly, for the next 10 years.
   a. Use the installment savings formula to calculate your account balance at the end of the ten years, and
   b. determine the total amount you deposited and the total interest you earned over the 10 years.
7. Use the installment savings formula to determine the monthly deposit needed to have a $1,000,000 balance in an account paying 5.5% annual interest (compounded monthly), after 30 years.
8. For an initial loan of $460,000 at 7% annual interest, use the installment loan formula to calculate the loan balance after 18 monthly payments of $3,000 each.
9. Use the installment loan formula to calculate the monthly payment for a five-year, $27,000 installment loan at 7% annual interest.

Exam 3:

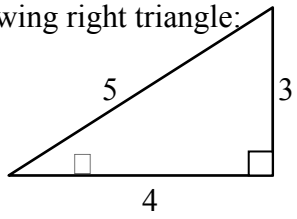
1. Given that 1 mile = 5,280 ft., CONVERT the rate 10 miles per hour to centimeters per second.
2. IDENTIFY the level of measurement for the values of each variable:
   a. the total costs of a week's worth of groceries for households
   b. the kinds of drinks ordered by customers at a bar
3. This problem uses the following diagram, which shows two pairs of parallel lines that intersect as shown at non-right angles as labeled:



   Identify all angles that have the same measurement as angle 15.
4. Draw an example of ONE plane curve that is SIMPLE, CLOSED, and CONVEX, then shade the INTERIOR of the curve.
5. In each lettered part, draw ONE triangle that fits BOTH of the descriptions. For credit in each part, the triangle you draw must "obviously" fit both descriptions.

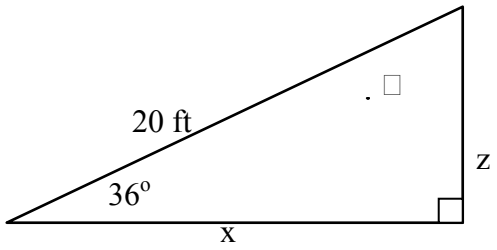
a. isosceles and obtuse.
b. scalene and right

6. Give the exact values (<u>as fractions</u>) of the three basic trigonometric ratios of the angle □ in the following right triangle:



$\sin(\theta) =$ _____ $\cos(\theta) =$ _____ $\tan(\theta) =$ _____

7. Solve the following right triangle:



8. Give decimal approximations for the <u>circumference</u> and <u>area</u> of a circle with a 10 inch diameter.
9. Draw diagrams and label the appropriate measurements of TWO DIFFERENT non-rectangular polygons that each has the same area as a square with side measurement 10.
10. CONVERT the volume measurement <u>1000 cubic feet</u> to cubic meters.

Exam 4:

1. Bob wanted to know how Oahu voters feel about the new contract with public school teachers that includes random drug testing. Bob surveyed 200 pedestrians he ran into at the corner of King and Bishop streets in downtown on a Friday afternoon.
   Describe Bob's stated or implied population(s) of interest and the sample(s) that were used for his study. Be sure that your description is specific enough to show that you understand the difference between a population and a sample.
2. Determine the mode (if one exists) and the median for the following ordered data set:

13	15	15	17	17	17	17	21	24	25
25	26	28	31	34	37	40	42	43	43
50	52	54	56	58	61	63	64	65	67

3. For the following ordered data set (identical to the one in problem 2), fill in the frequencies and relative frequencies in the grouped distribution table.

13	15	15	17	17	17	17	21	24	25
25	26	28	31	34	37	40	42	43	43
50	52	54	56	58	61	63	64	65	67

Class	Frequency	Relative frequency
10-19		

20-29		
30-39		
40-49		
50-59		
60-69		

4. Draw the following graphs to represent the grouped frequency distribution you created for problem 3. Be sure to label your axes appropriately:

   a. a frequency polygon

   b. a histogram

5. Determine the SAMPLE MEAN and SAMPLE STANDARD DEVIATION for the following ordered data set:

   3 3 3 6 7 11 16

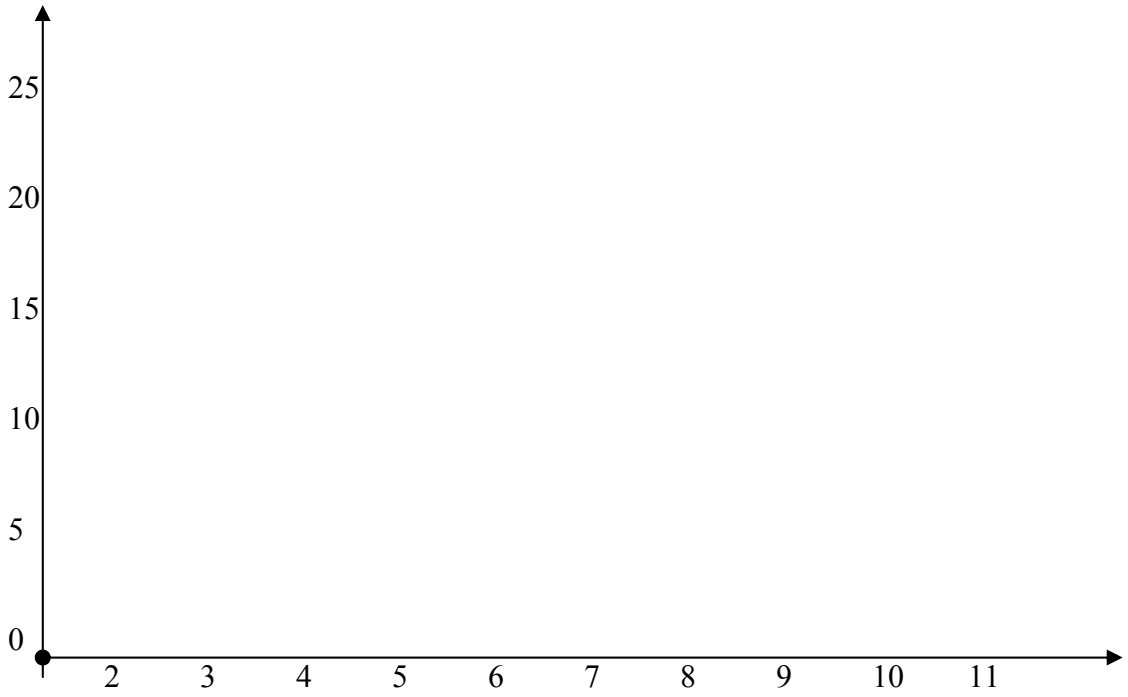
6. Calculate the z score for each of the different data values of the data set in problem 5.

value	z score

3	
6	
7	
11	
16	

7. For the following paired data set, draw a scatter diagram.

X:	2	4	5	8	8	11
Y:	6	12	11	15	23	21



8. Determine the equation of the regression line and the correlation coefficient for the paired data set from problem 7.

9. For the following contingency table, create a set of EITHER stacked OR segmented bar graphs (mixed or other graph types will not receive credit).

	Coca-Cola	Pepsi Cola	Other cola
Male	20	11	6
Female	8	18	5

10. When asked, "What is your favorite pet?" out sample gave the following frequency distribution:

Pet:	Frequency:
Dog	33
Cat	29
Bird	9
Other	7

Calculate, then construct a pie chart to represent, the relative frequencies.

LEEWARD COMMUNITY COLLEGE
Mathematics and Natural Sciences Division
Course Syllabus – SPRING 2008
MATH 100 - SURVEY OF MATHEMATICS (3.0 credits, CRN 55250)

Catalog Course Description: MATH 100 includes a variety of selected mathematical topics designed to acquaint students with examples of mathematical reasoning. The topics included in a given section or academic term are chosen by the instructor to demonstrate the beauty and power of mathematics from applied, symbolic, and abstract standpoints. MATH 100 is not intended as, and does not qualify as, a prerequisite for advanced mathematics courses.

Prerequisites: C or better in MATH 83 (formerly numbered 25) or equivalent, within the past two years

Co-requisites: None

Recommended Preparations: None

THIS IS A TELEWEB COURSE!

The lectures were taped in advance and will be broadcast on Oceanic cable channel 55 (or equivalent) according to the "*Broadcast and Testing Schedule*" document that will be available for viewing, downloading, and printing from the course Yahoo group by the week before the start of the semester.

Information printed in this course syllabus and in the *Broadcast and Testing Schedule* supersedes any conflicting announcement made during the broadcast sessions!

Students are expected to subscribe to cable television and record each lecture for viewing and possible review, particularly before the exams. Oahu students can view a tape of a missed lecture in the Leeward CC Library or Math Lab (MS-204). Neighbor island students must verify the availability of lecture tapes with their home campuses. Video on demand (VOD) will also be available to students who miss a lecture broadcast, but students are cautioned that VOD should NOT be used as a primary means of viewing the lecture sessions.

There are also some internet components to the course so daily access to the email and the web are required. WebCT will NOT be used. Instead, announcements and course materials will be made available through the course Yahoo group.

Four ON-CAMPUS chapter exams are required for this course. It is possible for a student to arrange for an alternate testing sites (with advance approval), but such exams MUST be proctored by an appropriate third party. This course CANNOT be successfully completed entirely from home.

This course is NOT self-paced. Barring emergencies, students must take each exam during its scheduled testing time frame, as listed in the *Broadcast and Testing Schedule*.

TEXTBOOKS AND OTHER REQUIRED RESOURCES:

TECHNICAL: In addition to having daily access to cable television broadcasts and a device to record the lectures, each student enrolled in this course is required to have daily access to the internet and an email account. Email will be the primary means of contact both with me and, if desired, with other students in the class. Students are required to join the course Yahoo group and either elect to receive group messages or log into the group daily to check for and to read course announcements and assignments. It is vital that students check the email account they designated when they joined the Yahoo group, since that is where the group messages will be sent. Course documents will be posted to the group as "pdf" files, which require version 6 or higher of the Adobe Reader (available for free download from http://www.adobe.com). Students are expected to access, read, and print such documents on their own. The college will NOT provide such course materials in printed form!

ALTERNATE TECHNOLOGY ACCESS PLAN: In registering for a Distance Education course (Cable or Web) the student is responsible for finding immediate alternate access to a computer with Internet connectivity or cable television should that student experience technical difficulties. Technical difficulties can include but are not limited to problems with a student's computer hardware/software; inoperability of a student's VCR or DVR; or lack of service by a student's Internet Service Provider (ISP) or Cable Provider. Technical issues do not constitute the extension of an assignment, project, quiz or exam deadline unless agreed upon by the instructor. An Alternate Technology Access Plan will be made by the student prior to the start of the semester and should be implemented immediately upon encountering technical difficulties. The student is required to continue course work as a result of having an alternate plan of access while independently resolving any technical issues with hardware/software, VCR/DVD, ISP, or Cable Provider.

VIDEO ON DEMAND: Students who have broadband internet access (cable or DSL but NOT dial-up) can view a missed lecture session by using Video On Demand (VOD). Due to bandwidth limitations, VOD is NOT to be used as a primary means of viewing the class lectures. Login directions will be sent by email as a group message at the beginning of the semester. To meet with copyright guidelines, each class session's VOD videostream will be accessible for two weeks after the first cable broadcast. However, VOD videostreams for class sessions initially broadcast during the last two weeks of the course are accessible only until the last day of instruction. **Neither your instructor nor Leeward Community College provides support for VOD. All questions or concerns regarding the use of VOD must be emailed to their support account: vod-support-l@hawaii.edu.**

TEXTBOOK: Mathematics: Reasons, Results, and Applications, Second Preliminary Edition, by Eric Matsuoka.

The printed textbook is available for purchase in the Leeward Community College bookstore. In addition, pdf files of each chapter are available for viewing and printing from the course Yahoo group.

CALCULATOR: A scientific calculator capable of two-variable statistical functions is REQUIRED but computers, personal data assistants, or other devices capable of substantial text storage will NOT be allowed on exams.

The widely-available TI-30xIIS (with TWO numerical display lines) is sufficient, inexpensive, and fairly easy to use, and thus recommended; however, other TI-30 models (with only one numerical display line) are NOT SUFFICIENT because they are not programmed with two-variable statistics functions. Graphing calculators are allowed but not required since there are only a few occasions where their special functions might be useful.

The TI-82/83/84 graphing calculators and the recommended TI-30xIIS are the only calculator models that are supported in this course. Other makes/models may have the required functions but assistance on their use will not be available. A student who needs assistance on such other makes/models must refer to their calculator's instruction manuals and/or seek support from the calculator's manufacturer.

Printed directions for the statistical functions of the TI-30xIIS are posted in the Yahoo group. Streaming videos showing how to use the TI-84 and TI-30xIIS calculators are available for viewing from links in the course Yahoo group.

STUDENT LEARNING OUTCOMES:

Upon successful completion of Math 100, students should be able to:

- model applied problems symbolically and perform manipulations on the symbols within an appropriately selected mathematical or logical formal system.
- distinguish between a rigorous proof and a conjecture.
- author an elementary proof.
- correctly select, then appropriately apply, formal rules or algorithms to solve numeric, symbolic, graphical, and/or applied problems.
- assess the reasonableness of, then appropriately communicate, the solutions to problems.

GRADING POLICY:

WEEKLY EMAILED PROBLEMS: Each Monday or Tuesday of the first through the fifteenth instructional weeks of the semester, I will send a set of problems as an email message through the math100 Yahoo group. Each student is required to send their answers, either as a REPLY BY EMAIL* or by EMAILING directly to ematsuok@hawaii.edu, by the due date announced in the assignment. In addition to counting toward a student's course grade (5 base points per week toward a student's overall course percentage), I may, if needed or appropriate, use a student's answers to these problems as evidence of his/her dates of "attendance" for financial aid or other purposes.

*Replies sent from course Yahoo group page are discouraged because a student replying in that manner cannot save a copy of their work or send a cc of their submission to their own email account.

NON- OR LATE SUBMISSION OF EMAILED PROBLEMS: As noted in the preceding section, students are required to submit their answers to the weekly emailed problems by the announced due date. Students who do not submit answers will receive zero earned points for problem set. Submissions sent after the due date will NOT be accepted for point credit but instead will be evaluated only to verify their correctness/appropriateness.

ASSISTANCE ON WEEKLY EMAILED PROBLEMS: Since the weekly emailed problems are scored and count directly toward a student's course grade, a student must submit their best effort before asking for assistance on the problems.

TEXTBOOK HOMEWORK: Students should try ALL of the problems at the end of each section. These textbook problems will NOT be collected or graded unless specifically called for in an emailed assignment. Even so, students should work on the problems soon after viewing the session(s) covering the respective

section(s) both to help learn the material and (from a more practical perspective) to help prepare for exams, since exam problems will come from, or be based on, these problems. Answers (which may be partial answers or suggestions) to many of the these problems are listed at the end of each respective chapter.

TEXTBOOK HOMEWORK QUESTIONS AND "ANSWERS": Partial, selected, and/or suggested answers to many of the problems are printed at the end of each chapter so students are able to check most of their computational answers. There are some misprints in these answers so it is not correct to assume that an answer is automatically wrong if it does not match the printed answer. It is very important for students to email me immediately if any questions arise regarding the homework problems. Since one of my purposes in assigning homework problems it to help students to remember and learn the material, students should try to phrase questions constructively. As an example, consider the difference between, "I can't do problem 3. What is the answer?" and "In problem 3, I tried applying the formula from page 88, but I didn't know what value to use for n."

EXAMS: There will be four exams that must each be taken at an approved, proctored testing site. Each exam must be taken on any one date during the appropriate interval listed in the *Broadcast and Testing Schedule*. Each exam will be a NON-cumulative chapter exam worth 50 base points. Exam 1 covers chapter 1, exam 2 covers chapter 2, exam 3 covers chapter 3, and exam 4 covers chapter 4.

TESTING LOCATIONS: In general, students are expected to take their exams in the Leeward Community College Learning Resource Center (LRC) on a regularly-scheduled test date during the LRC's regularly-scheduled hours of operation. ANY EXCEPTION TO THIS GENERAL EXPECTATION, INCLUDING NEIGHBOR ISLAND STUDENTS, REQUIRES BOTH INSTRUCTOR AND TESTING CENTER NOTIFICATION AND APPROVAL IN ADVANCE! Students may also, on their own initiative and by arrangement and only with advance notification and approval, find and request to use an alternate test center. Students can see a listing UH system testing sites by clicking on the appropriate web address in the "links" section of the Yahoo group; however, due to recurring problems, neither Kapiolani Community College nor UH-Manoa is an allowable testing site for this course. Students who choose to take their exams at an alternate testing site (after requesting and receiving instructor approval in advance) become primarily responsible for following up with their chosen testing center if their completed exams are not returned to me for grading in a timely manner.

EXAM FORMAT: Each exam will contain one or two problems from each section of the chapter being tested. As noted previously, exam problems will be taken from, or based on, the end-of-section problems in your textbook. Each exam requires use of a calculator and has a 90 minute time limit. Each exam is closed-book and closed-notes with the following exception: a student may take into the testing area ONE sheet of letter-sized paper (up to 8.5 by 11 inches) with notes written on one or both sides of the sheet. This sheet must be submitted to the testing center upon completion of the exam. Students will write their work on the exams themselves.

OTHER EXAM CONDITIONS: Exams must be started AND completed during the testing center's regular hours. Each student will be required to show an appropriate form of identification when taking exams. Testing centers may refuse service to students who are unable or unwilling to appropriately verify their identities. The LRC does not permit personal items (books, purses, cell phones, etc.) in the testing area. Such items must be placed into a locker if they are brought to the LRC. Other testing centers may have similar policies.

RETESTING: Each exam may be attempted at most ONCE. Re-testing is NOT permitted.

LATE EXAMS: Since each student has multiple days to choose from for each exam, late exams taken after the end of the scheduled testing period are not allowed. The only exception to this general policy is if a student misses a single exam due to an emergency during the scheduled exam period with written documentation, a serious illness/injury during the scheduled exam period with written documentation, or other extraordinary circumstances during the scheduled exam period with written documentation. An approved late exam must be completed within a reasonable time period to be determined by the nature and dates of the documented circumstances. The exam questions on, and format of, a late exam may differ substantially from the exam given during the regularly-scheduled testing period. A scoring penalty may be assessed on an approved late exam. If applicable, such a scoring penalty will be based on the reason(s) for missing the initial exam period, the elapsed time between the exam schedule and the date the late exam is taken, and the elapsed time between the documented circumstances and the date the late exam is taken. At most ONE scoring penalty-free late exam is possible in this course. A second approved late exam will definitely be subject to a scoring penalty, even if the first was not.

MISSED EXAMS: A student who misses an exam and does not provide the required documentation of an emergency, serious illness/injury, or other extraordinary circumstances will receive a score of zero for the missed exam. A student who provides the required documentation but does not take the late exam when it is scheduled will receive a score of zero for the missed exam.

COURSE LETTER GRADES: Since each of the fifteen weekly emailed problem sets is worth 5 base points and each of the four exams is worth 50 base points, there is a total of 275 required base points for the semester; however, the number of base points for a student may vary due to the possibility of "Kodama" points that are described in the "extra credit possibilities" section below. The standard grading procedure is to assign course letter grades on the basis of the student's overall course percentage (the student's total earned points divided by the student's total base points) according to the following scale:

87.50% or greater earns an A
75.00% to 87.49% earns a B
62.50% to 74.99% earns a C
50.00% to 62.49% earns a D
Less than 50.00% earns an F

EXCEPTION TO THE STANDARD GRADING PROCEDURE: In the event that a student's EXAM score percentage (the sum of the student's four exam scores divided by 200 and converted to a percent) is greater than the student's overall course percentage, the student's course grade will be assigned using the exam score percentage instead of the overall course percentage.

"INCOMPLETE" GRADES: An "I" grade is used to indicate that the student has yet to complete a small but important part of the work for the course. It is given at the instructor's option. Work must be made up by the end of the 10th week of the following semester. "I" reverts to a "contingency" grade assigned at the time of final evaluation.

"Incomplete" grades will only be considered if a student misses the last exam due to an emergency with written documentation. An "I" grade will NOT be assigned to students who missed a substantial portion of the course, or to students who are simply "not ready" for the last exam. If an "I" grade is assigned, only the

last exam can be made up; all other scores, including zero scores, will remain as they were originally recorded.

EXTRA CREDIT POSSIBILITIES:

• Bonus points may be awarded for exceptional work on an exam. If awarded, such points become "pure" extra credit in that they only increase the number of points earned on the exam but leave the base points unchanged. Thus, it is possible for a student to earn more than 50 points (and thus more than 100%) on a 50 base point exam.

• The student who submits the first weekly emailed assignment response that earns a "full credit" score of 5 points will receive a bonus of 5 "Kodama" points. Students who take the time and effort to write exceptionally thoughtful and appropriate/correct responses will also receive a bonus of 5 "Kodama" points. "Kodama" points are NOT pure extra credit in that "Kodama" points are added to BOTH a student's earned point total AND the student's base point total when the overall course percentage is calculated. Since "Kodama" points do not alter exam scores, they are NOT applicable to the "exception to the standard grading procedure" described above. "Kodama" points are named for Professor Linda Kodama of Kapiolani Community College, from whom I learned this ingenious computational technique.

• I may send an extra credit offer by email through the Yahoo group, but such opportunities have only been made occasionally in the past and may not occur at all this term. If such an offer is made, be sure to read the conditions very carefully because the offer will have an expiration or due date (which will be absolute) and the offer might be for "Kodama" points or for some form of "pure" extra credit points.

• A student who is interested in learning more than is required for the class can with approval work on one or more extra credit project(s) directly related to mathematics. There is no specific limit to the number of projects a student may attempt. A student who is interested in investigating a mathematical topic must contact me to discuss the proposed project. Other than the extra credit offers described above, I will not assign or even initially suggest an extra credit project topic. The first question I will ask if a student proposes an extra credit project is, "What do you hope to learn from doing this project?" A written report including a bibliography is required for each project. Credit for such extra credit projects will be treated as "Kodama" points and will be awarded on the basis of how much thought and effort a student put into the project as well as the level of learning or thinking that appears to have taken place during or as a result of the project. A project that merely satisfies a trivial curiosity and reports facts will probably not be worth the time it takes to do the research and writing since that time could and should have been used to study the required material. A PRINTED COPY of the written report must be submitted (in person during regularly scheduled office hours or by POSTAL mail) so that I receive it by college-designated last day of instruction. NO EXTRA CREDIT PROJECTS WILL BE ACCEPTED AFTER THAT DATE!

STUDENT WITH DISABILITIES STATEMENT:

Leeward Community College abides by Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, which stipulate that no student shall be denied the benefits of an education "solely by reason of a handicap." Students with documented disabilities who believe that they may need accommodations in this class are encouraged to contact the Coordinator of the KAKOʻO ʻIKE (KI) program as soon as possible to ensure that such accommodations are implemented in a timely fashion. The KI office is located in L-208, across from the elevator in the library building or call for information at 455-0421.