Name_____Date_____Period_____

AFM Final Exam Review: Part 1 (Standards 1.01, 1.02, and 1.03)

The standards below provide an overview of what we've done this year as well as what you will be expected to do and know for the final exam.

Competency Goal 1: The learner will analyze data and apply probability concepts to solve problems.

1.01 Create and use calculator-generated models of linear, polynomial, exponential, trigonometric, power, and logarithmic functions of bivariate data to solve problems.
   a. Interpret the constants, coefficients, and bases in the context of the data.
   b. Check models for goodness-of-fit; use the most appropriate model to draw conclusions and make predictions.

1.02 Summarize and analyze univariate data to solve problems.
   a. Apply and compare methods of data collection.
   b. Apply statistical principles and methods in sample surveys.
   c. Determine measures of central tendency and spread.
   d. Recognize, define, and use the normal distribution curve.
   e. Compare distributions of univariate data.

1.03 Use theoretical and experimental probability to model and solve problems.
   a. Use addition and multiplication principles.
   b. Calculate and apply permutations and combinations.
   c. Create and use simulations for probability models.
   d. Find expected values and determine fairness.
   e. Identify and use discrete random variables to solve problems.
   f. Apply the Binomial Theorem.

Competency Goal 2: The learner will use functions to solve problems.

2.01 Use logarithmic (common, natural) functions to model and solve problems; justify results.
   a. Solve using tables, graphs, and algebraic properties.
   b. Intepret the constants, coefficients, and bases in the context of the problem.

2.02 Use piecewise-defined functions to model and solve problems; justify results.
   a. Solve using tables, graphs, and algebraic properties.
   b. Interpret the constants, coefficients, and bases in the context of the problem.

2.03 Use power functions to model and solve problems; justify results.
   a. Solve using tables, graphs, and algebraic properties.
   b. Interpret the constants, coefficients, and bases in the context of the problem.

2.04 Use trigonometric (sine, cosine) functions to model and solve problems; justify results.
   a. Solve using tables, graphs, and algebraic properties
   b. Create and identify transformations with respect to period, amplitude, and vertical and horizontal shifts.
   c. Develop and use the law of sines and the law of cosines.

2.05 Use recursively-defined functions to model and solve problems.
   a. Find the sum of a finite sequence.
   b. Find the sum of an infinite sequence.
   c. Determine whether a given series converges or diverges.
   d. Translate between recursive and explicit representations.

Ways to review in addition to working through the exam reviews in class:

1. Come to tutoring. It's best to come with specific questions and a plan for what you want to accomplish during the session.

Thursday, 5/16	7:45-8:35 AM
Monday, 5/20	4:00-4:45 PM
Thursday, 5/23	7:45-8:35 AM
Wednesday, 5/29 (5th period exam day)	7:45-8:35 AM
Thursday, 5/30 (3rd period exam day)	7:45-8:35 AM
Friday, 5/31 (7th period exam day)	7:45-8:35 AM

2. Work through all old quizzes and test in your file. Bring your questions to tutoring.
3. See the MSL Sample Problems we've already done (see post online from 3/25/13).
4. Work through videos and practice questions at khanacademy.org. The vocabulary in the standards above will help you find what you're looking for. You can also ask Ms. Hennessey.
5. Don't cram the night before. It really doesn't work! Plan to study for about 30-60 minutes per day outside of school until exam day.
6. Get a good night's sleep and eat breakfast the morning of your exam.

★Standard 1.01: Create and use calculator-generated models of linear, polynomial, exponential, trigonometric, power, and logarithmic functions of bivariate data to solve problems.

a. Interpret the constants, coefficients, and bases in the context of the data.
b. Check models for goodness-of-fit; use the most appropriate model to draw conclusions and make predictions.

1. The following data shows the height *h* of a cliff jumper as a function of the time *t* (in seconds) after she has jumped off a cliff.

t	h
0.1	285
1.1	299
2.3	284
3.0	240
3.9	165
4.5	101
5.1	45

a. Does an exponential, quadratic, or linear function best fit the data?

b. Rounding to the nearest thousandth, write your model below.

H(t)=

c. What does the y-intercept mean in the context of this problem?

d. What was the cliff jumper's greatest distance from the ground?

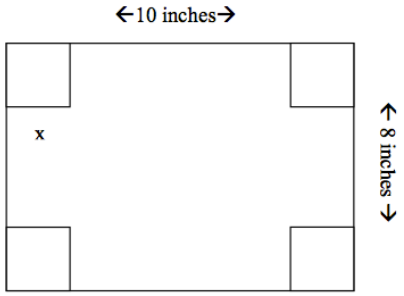
e. When will the cliff jumper hit the ground?

f. What is the practical domain in the context of this problem? The practical range?

g. What is the theoretical domain of the h(t) function? The theoretical range?

Where you should go for more review on this concept: Look at your Linear and Quadratics Test and Test Review. See post online from 10/12/12 for the key to that review. Google or search in khanacademy.org for "quadratics word problems."

2. A craftsperson starts with an 8"x10" piece of cardboard and cuts equal squares out of each corner. He needs to figure out how large the cut-out squares should be to maximize the volume of the box.



a. Write a function V(x) that expresses the volume *V* in cubic inches as a function of the side length *x* of the squares that are cut from the corners.

V(x)=

b. What side length would maximize the volume of the box? How did you get your answer?

c. What is the practical domain in the context of this problem? The practical range?

d. What is the theoretical domain of the V(x) function? The theoretical range?

Where you should go for more review on this concept: Look at the post online from 10/24/12, click on the link, and do problem #2. See also the Box Problem (10/22/12 post).

3. The following data shows the temperature *F* in °F at time *t* in hours after a corpse was discovered.

t	F
0	80
1.1	70
2.3	58
3.8	48
4.9	41
7.1	29
9.2	23

a. Does a linear, sine, or exponential function best fit the data?

b. Rounding to the nearest thousandth, write your model below.

F(t)=

c. If the person's temperature was 98.6°F at the time of death, for how many hours had he been dead at the time of discovery? Round to the nearest tenth.

d. What will the corpse's temperature be 10 hours after the time of discovery?

e. The ambient temperature is 0°F. What is the practical domain in the context of this problem? The practical range?

f. What is the theoretical domain of the F(t) function? The theoretical range?

Where you should go for more review on this concept: Look at your Exponentials Quiz and Exponentials Quiz Review. See post online from 11/13/12 for the key to that review. Google or search in khanacademy.org for "exponential decay."

4. The following data shows the height *h* in feet of a person on a Ferris at the time *t* in minutes that she boarded the Ferris wheel from a platform. The platform is at the same height as the center of the wheel.

t	h
0.1	3.1
0.4	12.1
0.8	21.2
1.3	24.8
1.7	21.1
2.2	9.2
2.6	−3.1
3.0	−14.7
3.6	−24.6
4.5	−14.7
4.8	−6.2

a. Draw a diagram of the Ferris wheel and rider. Label the height *h*.

b. Does a sine, power, or logarithmic (LnReg) function best fit the data?

c. Rounding to the nearest thousandth, write your model below.

H(t)=

d. At what height will the rider be after 12 minutes on the ride?

e. What is the radius of the wheel? Where can you get this information in the equation?

f. What is the practical domain in the context of this problem? The practical range?

g. What is the theoretical domain of the h(t) function? The theoretical range?

Where you should go for more review on this concept: Look at the Swing Lab (see 2/27/13 post). Go over the Sine and Cosine Functions Quiz and Quiz Review. See post online from 3/11/13 for the key to that review. Google "Ferris wheel word problems."

5. The following data shows the classwork/homework averages and the quiz/test averages of several students.

CW/HW	T/Q
51	65
81	84
72	77
94	96
89	92
99	100
76	79

a. Let x=CW/HW average and y=Quiz/Test average. Create a linear model of the data and describe the correlation (weak/strong, positive/negative).

Y(x)=

Correlation:

b. What does the y-intercept mean in the context of this problem?

c. What does the slope mean in the context of this problem?

d. According to the model, what Quiz/Test average would we expect from a student with a CW/HW average of 73?

Where you should go for more review on this concept: See the Queens Data Project (there's a post on this from 9/12/12 and it should be in your file). Go over your Linear Functions Quiz and Linear Functions Quiz Review. See post online from 9/26/12 for the key to that review.

6. You can determine which model is the best fit by looking at the value of R^2. The closer this number is to 1, the better the fit. To see this value on your calculator, hit 2^{nd}, 0, and scroll down to Diagnostic On. Hit Enter, Enter. Now when you calculate the regression you will see "r^2=" along with the coefficients a, b, c, etc. in the equation.

x	y
0.5	1
0.8	2
1.6	33
1.9	89
2.5	280
2.8	452
3.5	1150

a. Does a linear, exponential, or power function best fit this data?

b. Record your model and the value of R^2 below.

Y(x)=

R^2=

c. What is the y-intercept of the function you chose in part a?

d. Using your chosen function, find the value of y when x=3.

e. Using your chosen function, find the value of x when y=3.

Where you should go for more review on this concept: See the Power Functions Notes (3/15/13 post), the Comparing Power Functions Investigation (3/19/13 post includes key), and the Pendulum Lab (3/21/13 post).

★Standard 1.02, "Summarize and analyze univariate data to solve problems," was covered in the Statistics Unit from 4^{th} quarter. Review your Statistics Quiz and Statistics Test, as well as the reviews for both. The key to the Stats Test review was posted 4/23/13, and the key to the Stats Quiz review was posted 4/16/13.

★Standard 1.03, "Use theoretical and experimental probability to model and solve problems," was covered in the Probability Unit from 4^{th} quarter. Review your Probability Quiz and quiz review. The key to the probability quiz review was posted 5/9/13.