MATH 111: EXAM 02

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Answer the questions in the spaces provided on the question sheets and turn them in at the end of the class period. Unless otherwise stated, all supporting work is required.

Name: _____

1. Definitions

1 (4 Points). *(a) State the Point-Slope form of a line passing through the point* (x_1, y_1) *with slope* m*.*

(b) State the Slope-Intercept form of a line with slope m *and* y*-intercept* b*.*

2 (6 Points). *Let* $f(x)$ *be a function. State the average rate of change of* f *between* $x = a$ *and* $x = b$*.*

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3 (5 Points). *State the growth rate formula for a function $f(x)$.*

4 (3 Points). *(a) State the general form of an exponential function.*

(b) When does such a function model exponential growth?

(c) When does such a function model exponential decay?

5 (2 Points). *Consider the two lines $f(x) = m_1x + b_2$ an $g(x) = m_2x + b_2$.*
(a) When are f and g parallel?

(b) When are f and g perpendicular?

2. Problems

6 (16 Points)**.** *In the following problems, use the given information to find the equation of the line in slope-intercept form.*

(a) The line passing through the points $(2, 5)$ *and* $(4, 13)$*.*

(b) The line passing through the point $(-3, 3)$ *and parallel to the line* $2y - 4x = 20$*.*

(c) The line passing through the origin (that is, the point $(0, 0)$*) and perpendicular to the line* $2y - 4x = 20$*.*

7 (16 Points)**.** *Consider the two lines* $f(x) = 4x + 3$ *and* $g(x) = x + 12$*. Find the point (that is, the* (x, y) *pair) where these two lines intersect.*

8 (16 Points). *Let* $f(x) = x^2$.

(a) Compute the average rate of change for f *between* $x = 2$ *and* $x = 5$.

(b) Give the Point-Slope form of a line that passes through $(2, f(2))$ *and* $(5, f(5))$.

(c) Give the Slope-Intercept form of a line that passes through $(2, f(2))$ *and* $(5, f(5))$.

9 (16 Points)**.** *Alice is hosting an event. She is renting a facility, which costs* \$300*, and providing refreshments, which cost* \$4 *per guest.*

(a) Find a function, C*, that models the total cost of the event if* x *people attend.*

(b) Sketch a graph of C*.*

(c) Evaluate $C(10)$ *and* $C(15)$*. What do these numbers represent?*

(d) If the total cost for the event was 400*, how many people attended?*

10 (16 Points)**.** *A population of size* 25 *grows by* 20% *every day.*

(a) Give the growth factor for this population.

(b) Give an exponential model for the size of the population after t *days.*

(c) Determine the size of the population after 2 days. [Hint: Express the growth factor as a ratio, rather than a decimal, and this will be easy to compute.]

11 (Bonus - 10 Points)**.** *Let* $f(x) = m_1x + b_1$ *and* $g(x) = m_2x + b_2$*. Using* f *and* g*, derive the general formula for the intersection of two lines. Use this to explain why two parallel lines never intersect.*