

Show all your work & circle your answers. There are 58 points possible on this exam (+ another 5 extra credit points).

1) The line $f(x) = ax + b$ is displayed to the right. On the same set of axes, sketch and clearly label the following:

$g(x) =$ (1 point)

$h(x) =$ (1 point)

$i(x) =$ (2 points)



2) I see some zoo animals and have the following reactions:

<u>Zoo Animal</u>	<u>Reaction</u>
Bear	Fear
Okapi	Confusion



a) According to the table, is a function of ? Briefly explain.

_____ (2 points)

b) In this scenario, the variable is (circle your answer): **Zoo animal** **Reaction** (1 point)

3) The following tables display the relationship between variables A and B, and between variables C and D. Use these tables to answer the following true/false questions:

<u>A</u>	<u>B</u>
3	16

<u>C</u>	<u>D</u>
0	-10

a) True or False: A is a function of B. **TRUE** **FALSE** (1 point)

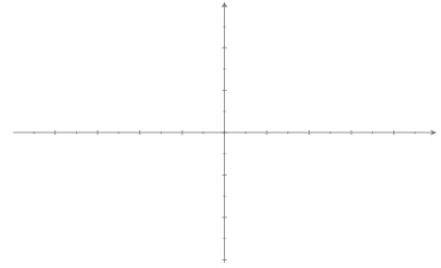
b) True or False: B is a function of A: **TRUE** **FALSE** (1 point)

c) Is C ? **YES** **NO** Briefly explain: _____

_____ (2 points)

4) On the axes displayed to the right, sketch and label a graph of a function that has the following properties:

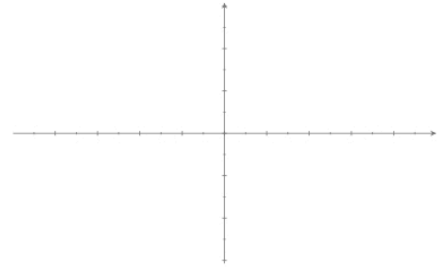
- a) The domain is [redacted]
- b) The range is [redacted]
- c) The function is [redacted] over the entire domain
- d) The function is always concave [redacted] (2 points)



5) On the axes displayed to the right, sketch a graph in which y is [redacted]

[redacted]

_____ (2 points)



6) In 2004, a total of [redacted] students attended St. Ambrose. Ten years later, that number increased to [redacted] students.

[redacted].

a) Find the formula that represents the number of students at St. Ambrose as a function of the year. Be sure to identify (or label) what your variables represent. (3 points)

b) According to your formula, by what year will St. Ambrose will have at least [redacted] students? (2 points)

c) According to your formula, how many students attended St. Ambrose when it first opened its doors in 1882? In 1882, there were actually 33 students at St. Ambrose (paying \$3 per month). [redacted]

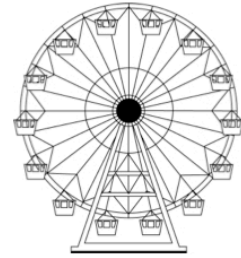
[redacted].

Predicted number of students in 1882 (from your formula) = _____ (1 point)

[redacted]

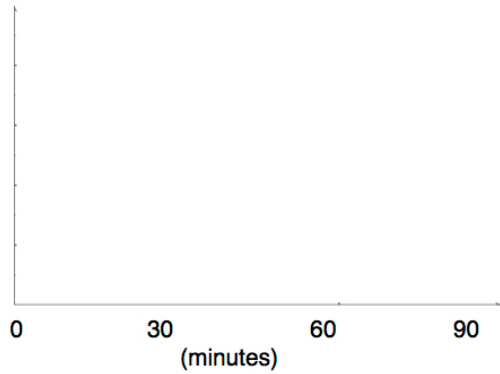
_____ (2 points)

- 7) Standing at [redacted] tall, the *Singapore Flyer* is the world's tallest Ferris Wheel. This Ferris Wheel is so big, it takes [redacted] for it to complete a full rotation.



Suppose you ride this Ferris Wheel for [redacted].

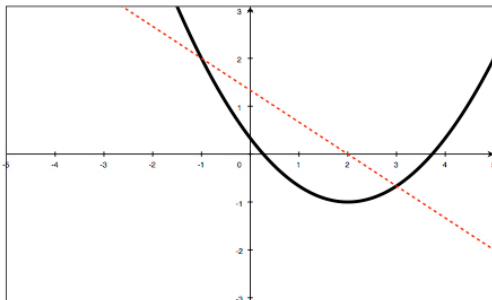
On the following axes, sketch a graph displaying [redacted] as a function of time. Label the y-axis (with a scale) and identify the domain and range of this function. (4 points)



Domain: _____

Range: _____

- 18) The graph of $f(x) = [redacted]$ is displayed below (in black). A secant line (the red dotted line) was created [redacted]. Find the formula for that (red dotted) secant line.



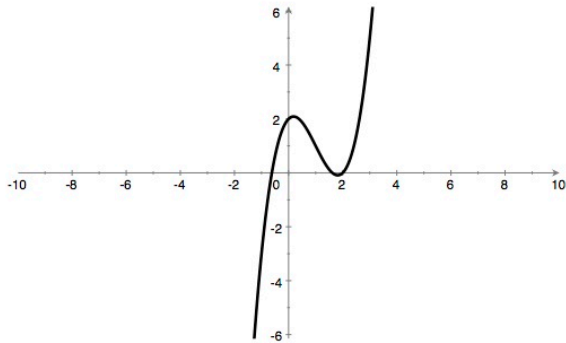
$y =$ _____ (3 points)

- 8) You decide to create your own website. To do this, you need to pay a one-time fee for a domain name and then a monthly web hosting fee. You're deciding between two companies:

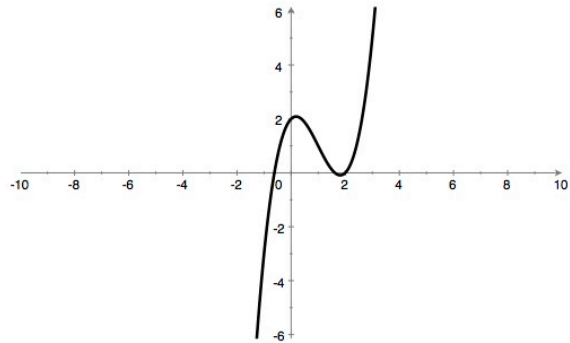
Company A charges [redacted]
 Company B charges [redacted]

Which company should you use to create your own website? Briefly explain your answer. (3 points)

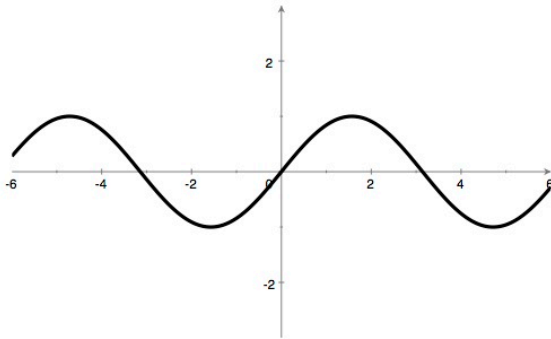
9) The graph of $f(x)$ is displayed below. On the same set of axes, sketch $h(x) = \square$ (1 point)



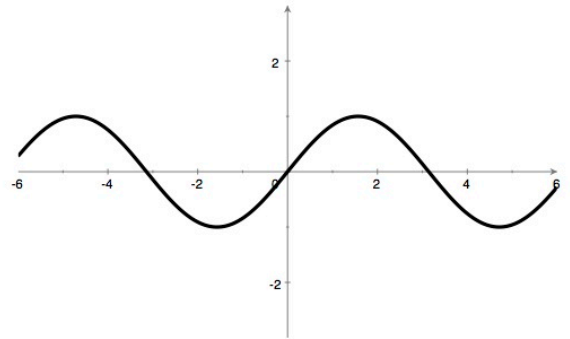
10) The graph of $f(x)$ is displayed below. On the same set of axes, sketch $g(x) = \square$ (1 point)



11) The graph of $f(x)$ is displayed below. On the same set of axes, sketch $j(x) = \square$ (1 point)



12) The graph of $f(x)$ is displayed below. On the same set of axes, sketch $k(x) = \square$ (2 points)



13)

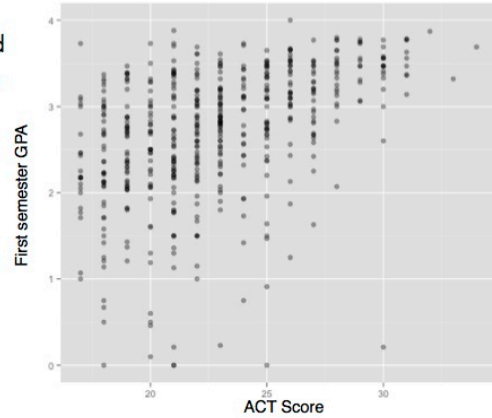


Sketch and label the graph of \square . Write out the formula for this piecewise function. (4 points)



$$f(x) = \left\{ \right.$$

14) In 2011, incoming freshmen at SAU had an average ACT score of 22.77. These same students, by the end of their first semester, had an average GPA of 2.71. To see if students with higher ACT scores earned higher GPAs, I created the graph displayed to the right.



I then had a computer find the least squares regression line to predict first semester GPA from ACT scores. The computer provided the following output:

GPA = [redacted]
 R² = [redacted]

Use the scatterplot and computer output to answer the following:

a) Use the least-squares regression line to predict the first semester GPA of students with an ACT score [redacted]

Predicted GPA for student with an ACT of [redacted] _____ (1 point)

b) Identify the y [redacted] in this formula. and briefly explain what it represents in this situation. (2 points)

The [redacted] = _____. Explanation of what it represents in this scenario: _____

c) [redacted] Be specific and briefly explain your answer using a number or two. (2 points)

15) I then had the computer run a linear regression to predict first-semester GPAs as a function of both ACT scores and high school GPAs. Here's the computer output:

GPA = [redacted] + [redacted] (ACT) + [redacted] (high school GPA)
 R² = 0.3424

Interpret the [redacted] in the formula (what does [redacted] represent in this situation?)

_____ (2 points)

16)



a) Interpret the R^2 value in this formula. _____ ?

_____ (2 points)

b)



_____ (2 points)

17) The graph of $f(x)$ is displayed to the right.

Circle TRUE or FALSE: (1 point each)

a) $f(1)$ is _____ **TRUE** **FALSE**

b) $f(0)$ _____ 2. **TRUE** **FALSE**

Fill-in the blanks: (1 point each)

a) $f(\quad)$ = _____

b) If $f(a) = 3$, _____

c) $f(-4) =$ _____

