# PRECALCULUS I/MATH 126

# SHANNON MYERS

- π 100 POINTS POSSIBLE
- π YOUR WORK MUST SUPPORT YOUR ANSWER FOR FULL CREDIT TO BE AWARDED
- π YOU MAY USE A SCIENTIFIC AND/OR A TI-83/84/85/86 CALCULATOR
- π PROVIDE EXACT ANSWERS UNLESS OTHERWISE INDICATED



ONCE YOU BEGIN THE EXAM, YOU MAY NOT LEAVE THE PROCTORING CENTER UNTIL YOU ARE FINISHED...THIS MEANS NO BATHROOM BREAKS!

NAME_____

**PLEASE MAKE SURE YOU ARE TAKING THE CORRECT EXAM!!!**

EXAM 1/100 POINTS POSSIBLE

**CREDIT WILL BE AWARDED BASED ON WORK SHOWN. THERE WILL BE NO CREDIT FOR GUESSING. PLEASE PRESENT YOUR WORK IN AN ORGANIZED, EASY TO READ FASHION.**

1. (9 POINTS) Let $g(x) = x^3 + x$ .

   a. (3 POINTS) Is $g$ odd, even, or neither odd nor even. Please explain.

   b. (3 POINTS) Find the average rate of change from -4 to 1.

   c. (3 POINTS) Find an equation of the secant line containing $\left(-4, g(-4)\right)$ and $\left(1, g(1)\right)$. Give your result in the **point-slope form of the line**.

2. (4 POINTS) Use a graphing calculator to approximate the real solutions, if any, of the given equation rounded to **two decimal places**. All solutions lie between -10 and 10.

$$2x^4 + 40x = 5x^3 + 23x^2 - 56$$

3. (8 POINTS) The function below is defined by three equations. Find the indicated function values.

$$f(x) = \begin{cases} \sqrt[3]{x} & \text{if } x < -1 \\ x^2 & \text{if } -1 \leq x \leq 2 \\ 8 & \text{if } x > 2 \end{cases}$$

a. $f(-1) = $ _____

c. $f(0) = $ _____

b. $f(-8) = $ _____

d. $f(-8) + f(4) = $ _____

4. (8 POINTS) Find the difference quotient of $f$; that is, find $\dfrac{f(x+h) - f(x)}{h}$, $h \neq 0$, for the following

function. Simplify your answer.

$$f(x) = 3 - x^2$$

5. (9 POINTS) If a rock falls from a height of 80 meters on Earth, the height $H$ in meters after $x$ seconds is approximately $H(x) = 80 - 4.9x^2$. Round your answers to **three decimal places**. Give the appropriate **units** with your answers.
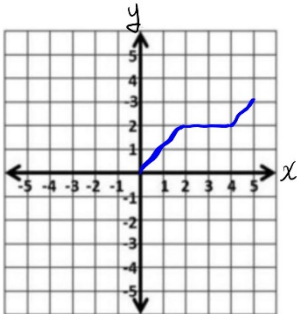
    a. What is the height of the rock when $x = 2.5$ seconds? _____

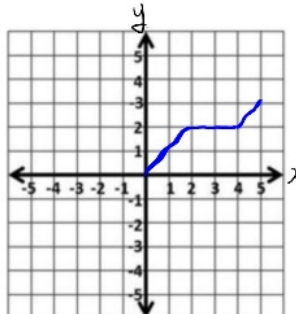    b. When is the height of the rock 10 meters? _____

    c. When does the rock hit the ground? _____
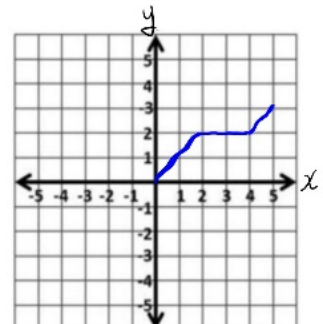
6. (6 POINTS) Complete the graph so that the graph is symmetric with respect to the:

    a. Origin                              b. x-axis                            c. y-axis



4

7. (8 POINTS) The function $f$ is defined as follows: $f(x) = \text{int}(x)$ (also notated $f(x) = [\![x]\!]$).
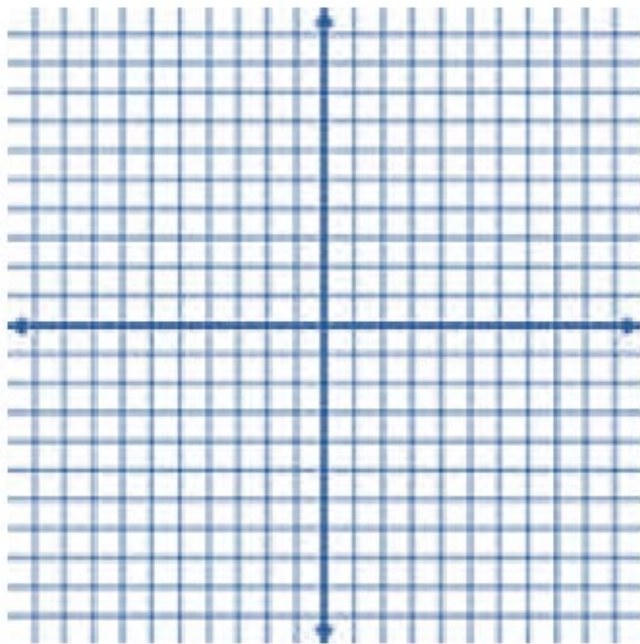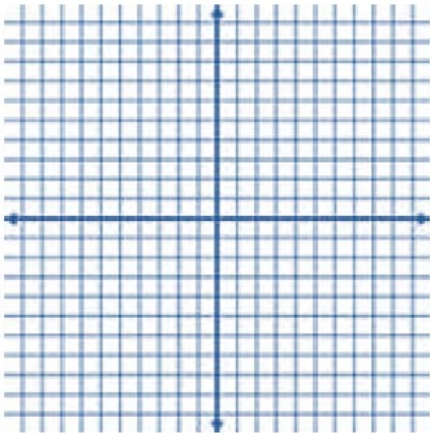


   a. (4 POINTS) Graph the function. Be sure to label axes and scale.

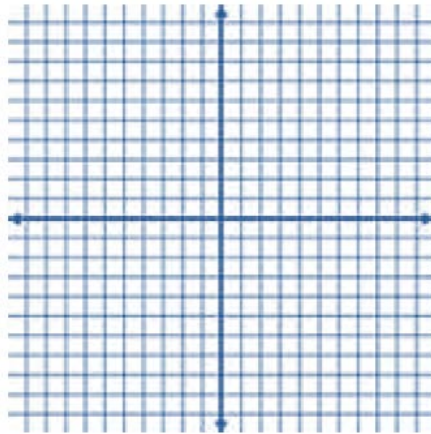   b. (2 POINTS) What is the domain? _____

   c. (2 POINTS) Is $f$ continuous on its domain?_____

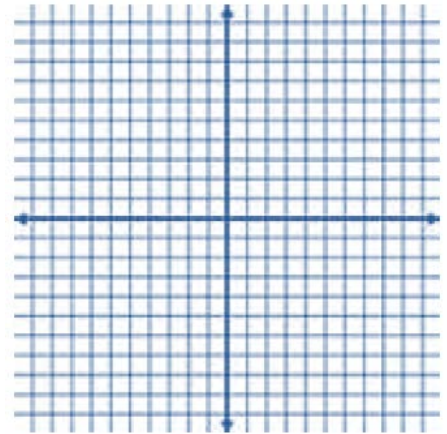8. (4 POINTS) Give the domain of $f(x) = \dfrac{x}{x+3}$ in interval notation.

5

9. (9 POINTS) Graph $g(x) = -2\sqrt{x+3}$ **by hand, using transformations**. Fill in the blanks below to indicate the first two graphs. DO NOT USE YOUR GRAPHING CALCULATOR!
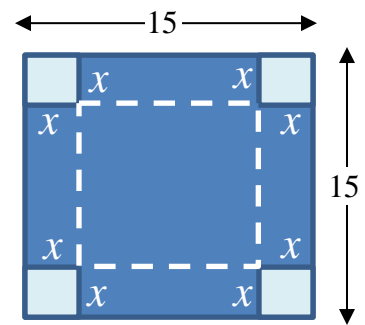
$y_1 = $ _____     $y_2 = $ _____     $g(x) = -2\sqrt{x+3}$

10. (8 POINTS) An open box with a square base is to be made from a piece of cardboard 15 inches on a side by cutting out a square from each corner and turning up the sides.
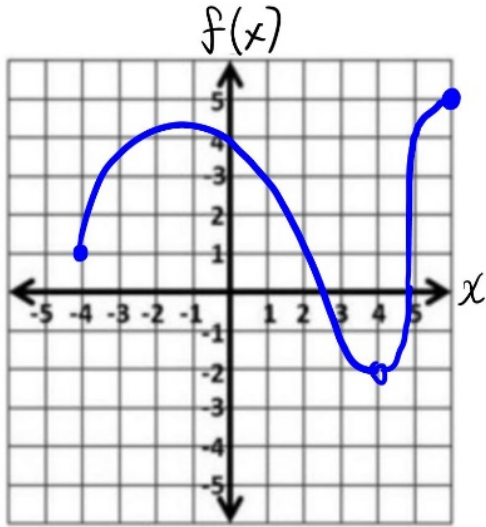
a. (4 POINTS) Express the volume $V$ of the box as a function of the length $x$.

b. (2 POINTS) What is the volume if a 5-inch square is cut out?

c. (2 POINTS) Graph $V = V(x)$. For what value of $x$ is $V$ largest? _____

11. (9 POINTS) Consider the graph of $f(x)$ below. Round your answer to the nearest tenth. If the graph does not have a certain characteristic, write "none".

$f(x)$

a. What are the zeros of $f$ ?_____

b. $f(0) =$ _____

c. What is the absolute maximum? _____

d. What is the absolute minimum? _____

e. On what interval(s) is $f$ decreasing?_____

f. On what interval(s) is $f$ increasing?_____

g. What is the domain of $f$ ? _____

h. What is the range of $f$ ? _____
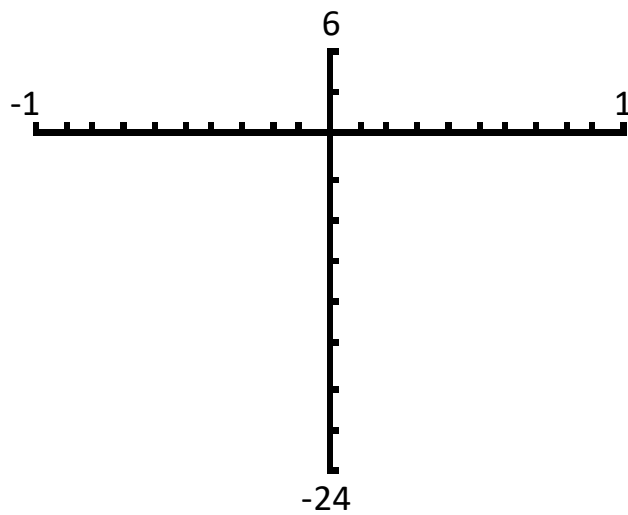
i. For what values of $x$ is $f(x) < 0$?_____

12. (6 POINTS) Use the graph of the functions to answer the following questions.

$f(x)$

$g(x)$

a. $(fg)(3) =$ _____

b. $(f + g)(0) =$ _____

c. $\left(\dfrac{f}{g}\right)(-3) =$ _____

7
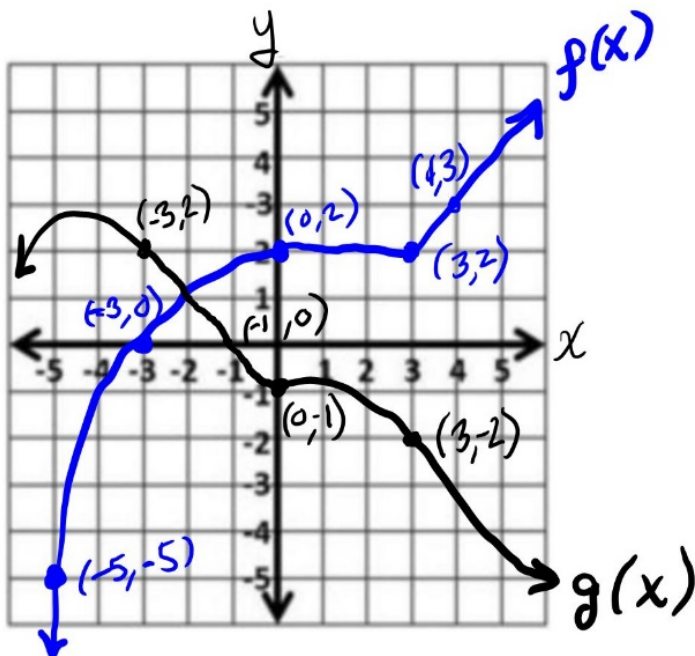
13. (6 POINTS) Find the equation of the line that is parallel to the line $y = -\dfrac{5}{2}x - 1$ and passes through the point $(-1, 4)$ .

14. (6 POINTS) Determine the viewing window used.



a. Xmin =_____

b. Xmax =_____

c. Xscl = _____

d. Ymin =_____

e. Ymax =_____

f. Yscl = _____