

Name: \_\_\_\_\_  
Calculator: \_\_\_\_\_  
Class Meeting Time: \_\_\_\_\_

**MATH 1813, Exam 1(A), 100 points**  
**February 13, 2019**

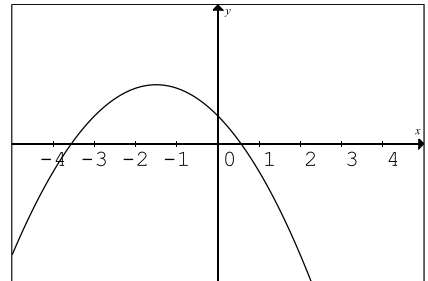
Only **one** calculator may be used on the exam. No TI-89, TI-92, TI-Nspire, or similar calculators may be used. Cell phone calculators, computers, laptops, and tablets are also prohibited. You **MUST show work** in the space provided to receive full credit.

1. (8 pts.) A taxi service charges an initial fee of \$0.40 for using the service and \$0.97 for every mile driven. Let  $C$  represent the total cost of a taxi ride and  $m$  represent the miles driven.

(a) Write an equation to represent the cost  $C$  of a taxi ride of  $m$  miles.

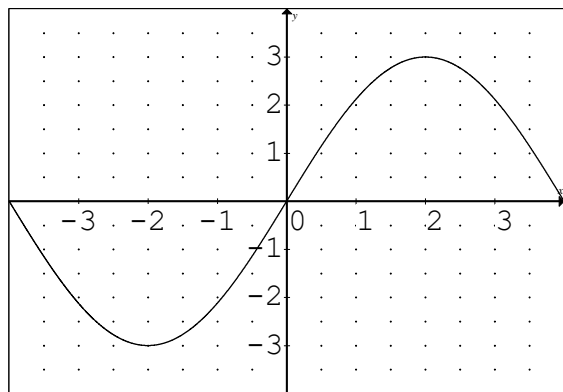
(b) Explain in words what the ordered pair  $(m, C) = (20, 19.8)$  describes in the context of this situation.

2. (9 pts.) For the function  $g(x) = -\frac{1}{2}x^2 - \frac{3}{2}x + 1$ , what is the average rate of change from  $x = 0$  to  $x = 2$ ? **Show your work.**

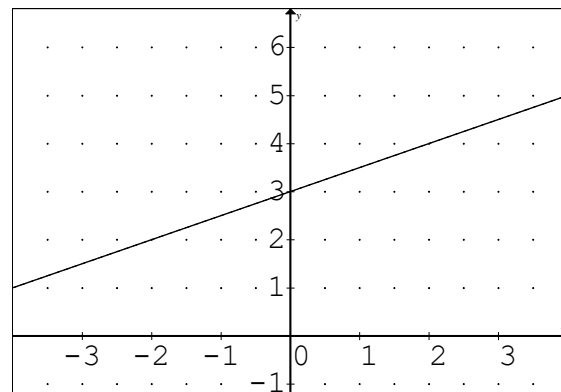


3. (8 pts.) Which function has the *greatest* average rate of change from  $x = -2$  to  $x = 2$ ?  
**Show your work (or explain).** *Circle your answer choice.*

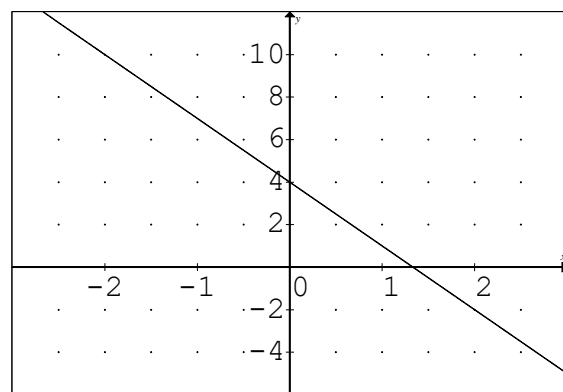
(a)



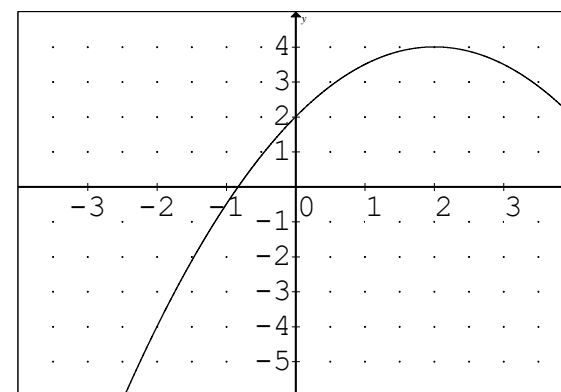
(b)



(c)



(d)



**Show work or explain:**

4. (12 pts.) For the linear function  $f$  with the given values,  $f(4) = -4$  and  $f(8) = -10$ , find each of the following.

(a) Write an equation for  $f$ . Write your answer in the form  $f(x) = mx + b$ . **Show your work.**

(b) Write an equation for the line perpendicular to  $f$  through the point  $(6, -7)$ . Write your answer in the form  $g(x) = mx + b$ . **Show your work.**

5. (12 pts.) Find the domain of each of the following functions. Write your answers in interval notation. **Show your work.**

(a)  $f(x) = \frac{\sqrt{x-6}}{x^2 + x - 6}$

(b)  $g(x) = \frac{1}{(x+1)^2 - 25}$

6. (8 pts.) Mr. Green has a water garden pond which he must fill with water. The table shows the volume  $V$  of water in the pond  $t$  minutes after Mr. Green starts filling it.

$t =$ time (minutes)	2	5	7	12
$V =$ Volume of water (gallons)	6.2	13.7	18.7	31.2

(a) Does the data in the table show  $V$  as a linear function of  $t$ ? **Show your work.**

(b) Write an equation for  $V$  as a function of  $t$ . **Show your work.**

7. (6 pts.) A function  $f$  has average rates of change as shown in the table.

<b><math>x</math> interval</b>	-2 to 0	0 to 2	2 to 4	4 to 6
<b>Average rate of change of <math>f</math></b>	-1.5	-0.38	-0.09	-0.02

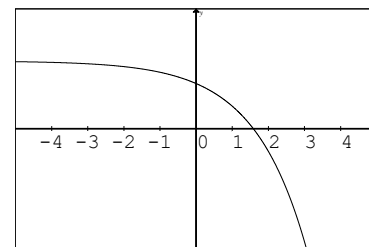
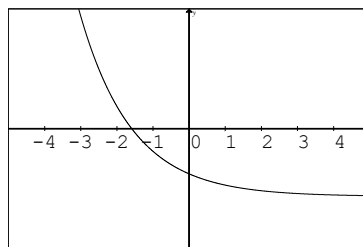
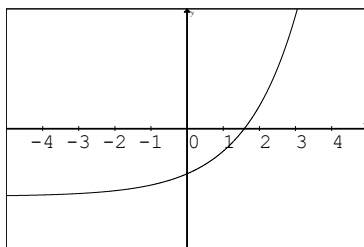
Which of the following graphs *could be* the graph of  $f$ ? *Explain.*

Circle your answer choice.

(a)

(b)

(c)

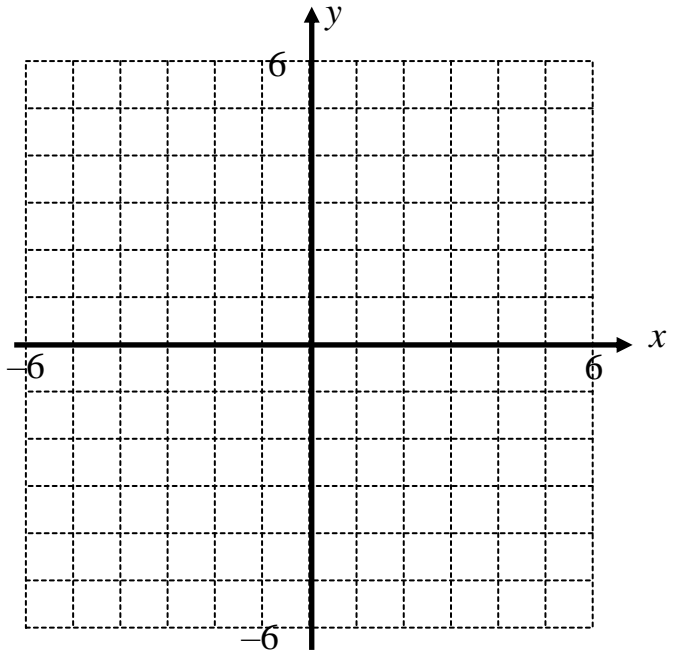


**Explain:**

8. (8 pts.) Consider the following piecewise function:

$$f(x) = \begin{cases} 3, & x < 2 \\ \frac{1}{2}x - 2, & x \geq 2 \end{cases}$$

(a) Find  $f(-4)$  and  $f(2)$ . **Show your work.**

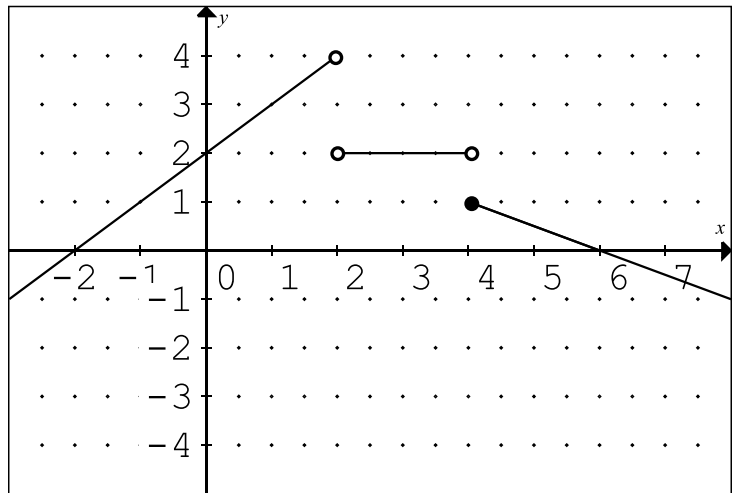


(b) Sketch the graph of the function.

9. (6 pts.) Find the domain and range of the piecewise-defined function shown. *Write your answers in interval notation.*

Domain: \_\_\_\_\_

Range: \_\_\_\_\_



10. (11 pts.) Find the formula for the parabola whose zeros are  $x = -3$  and  $x = 4$  which passes through the point  $(-4, -6)$ . Write your answer in standard form,  $f(x) = ax^2 + bx + c$ , and simplify completely. **Show your work.**

11. (12 pts.) A company selling a new flavored water has begun an advertising campaign. Its weekly sales are given by the function  $S(x) = -x^2 + 40x + 100$ . Here  $S$  represents the weekly sales (in thousands of dollars)  $x$  weeks after the advertising campaign began.

(a) Convert  $S$  to vertex form by *completing the square*. **Show your work.**

(b) What are the coordinates of the vertex? *Explain their meaning in the context of the problem.*

(c) Assume the formula for  $S$  is valid for only the first 30 weeks. So, the domain for  $S$  is  $0 \leq x \leq 30$  weeks. What is the range for  $S$ ? *Write your answer in interval notation.* **Show your work (or explain).**

Range: \_\_\_\_\_