

MATH 107 QUIZ 3

Oct 2019

Instructor: Dr. Fitzpatrick

NAME: _____

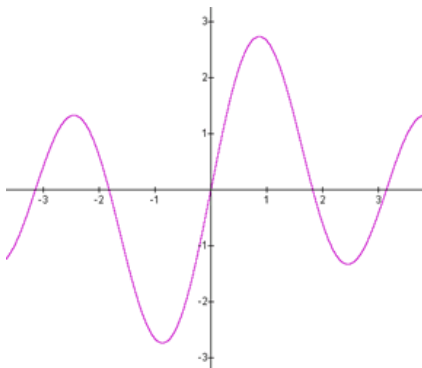
I have completed this assignment myself, working independently and not consulting anyone except the instructor.

INSTRUCTIONS

- The quiz is worth 100 points. There are 9 problems. This quiz is **open book** and **open notes**. This means that you may refer to your textbook, notes, and online classroom materials, but ***you must work independently and may not consult anyone*** (and confirm this with your submission). You may take as much time as you wish, provided you turn in your quiz no later than **Sunday, October 7**.
- **Show work/explanation where indicated. Answers without any work may earn little, if any, credit.** You may type or write your work in your copy of the quiz, or if you prefer, create a document containing your work. Scanned work is acceptable also. **In your document, be sure to include your name and the assertion of independence of work.**
- General quiz tips and instructions for submitting work are posted in the Quizzes module.
- If you have any questions, please contact me by e-mail.

1. (6 pts) For each graph, is the graph symmetric with respect to the x-axis? y-axis? origin? (No explanation required. Just answer **Yes** or **No** to each question.)

(a)



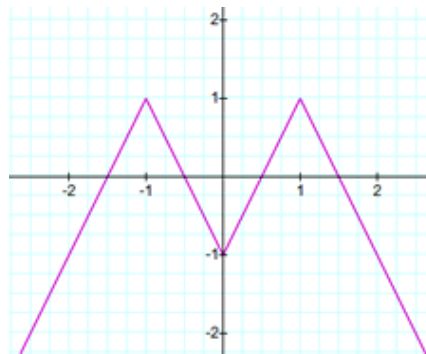
Symmetric with respect to the

x-axis? _____

y-axis? _____

origin? _____

(b)



Symmetric with respect to the

x-axis? _____

y-axis? _____

origin? _____

2. (6 pts) Let $f(x) = |x^2| - 10$. (no explanation required)

(a) State the zero(s) of the function. _____

(b) Which of the following is true? 2. _____

- A. f is an even function.
- B. f is an odd function.
- C. f is both even and odd.
- D. f is neither even nor odd.

3. (6 pts) Which of the following equations does the graph represent? **Show work or explanation.**

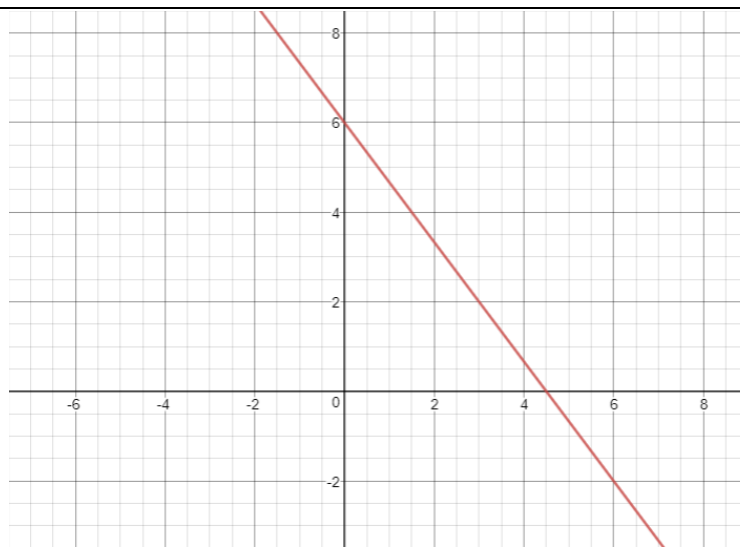
3. _____

A. $y = -\frac{4}{3}x + 8$

B. $y = -\frac{3}{4}x + 6$

C. $y = \frac{3}{4}x + 6$

D. $y = -\frac{4}{3}x + 6$



4. (12 pts) Consider the points (2, -7) and (-2, 1).

(a) Find the **slope-intercept equation** of the line passing through the two given points. **Show work.**

(b) Graph the line you found in (a), either drawing it on the grid in the previous problem #3, or generating the graph electronically and attaching it.

(c) Compare your line for this problem, #4, with the line in the previous problem #3. Are the two lines parallel, perpendicular, or neither parallel nor perpendicular? (The terms parallel and perpendicular are discussed on pages 166 and 167.) **No explanation required – just state the answer.**

5. (8 pts) The number of guests g in a water park t hours after 9 am is given by

$$g(t) = -32t^2 + 224t + 263 \text{ for } 0 \leq t \leq 8. \text{ } (t = 0 \text{ corresponds to 9 am})$$

Find and interpret the average rate of change of g over the interval $\{t \mid 4 \leq t \leq 7\} = [4, 7]$.

Show work.

6. (20 pts) Luke wants to purchase custom-made mugs to advertise his business. Two companies offer different deals:

Company A: Pay a design fee of \$40.00, plus \$5.50 per mug

or Company B: Pay a design fee of \$100.00, plus \$3.00 per mug

(a) State a linear function $f(x)$ that represents Company A's total charge for an order of x mugs.

(b) State a linear function $g(x)$ that represents Company B's total charge for an order of x mugs.

(c) Luke wants to purchase 120 custom-made mugs, as cheaply as possible. With which company should he place his order? **Show work/explanation.**

(d) For what number of mugs is the total charge exactly the same for both companies? **Show algebraic work/explanation.**

(e) Fill in the blanks:

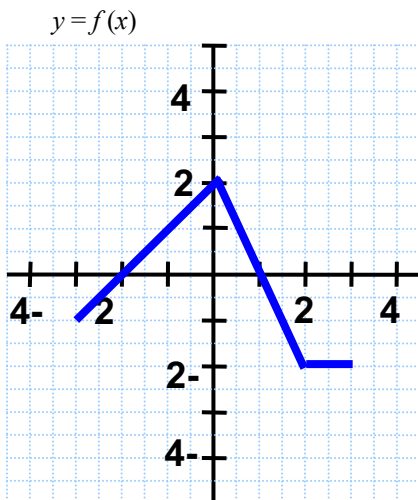
Company A is the cheaper option if _____ (choose *less or more*) than _____ (enter number) mugs are ordered.

7. (8 pts) A graph of $y = f(x)$ follows. No formula for f is given.

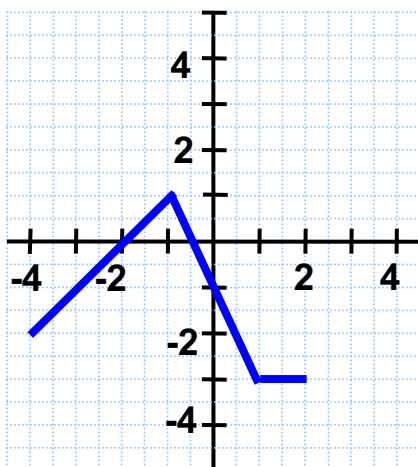
7. _____

Which graph (A, B, C, or D) represents the graph of $y = f(x + 1) + 1$?

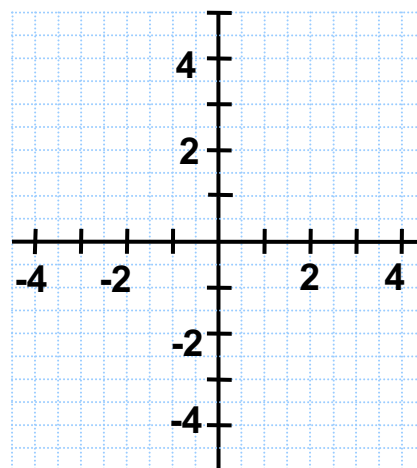
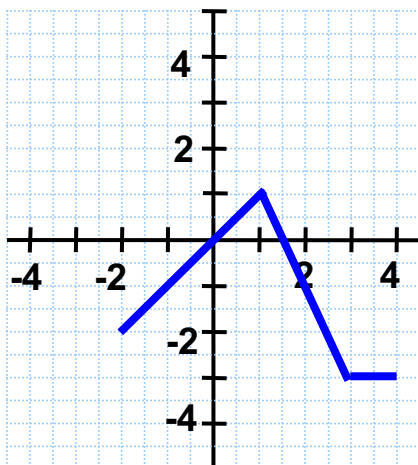
EXPLAIN YOUR CHOICE. (Grid supplied for scratch work; You are NOT required to submit your own graph)



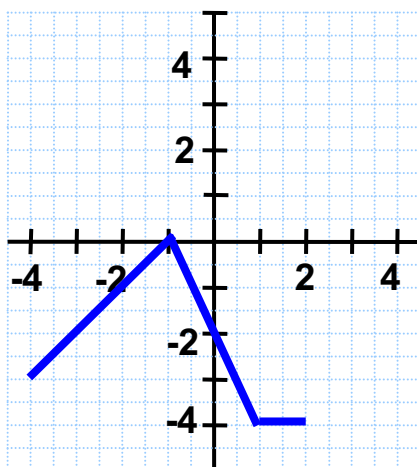
GRAPH A (below)



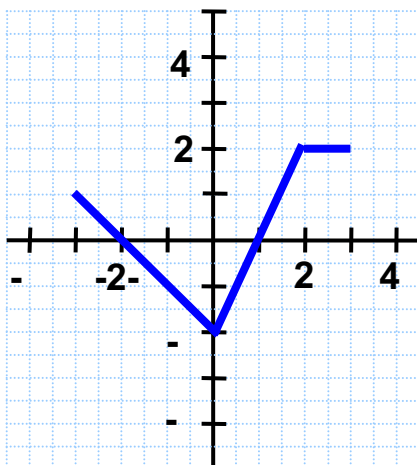
GRAPH C (below)



GRAPH B (below)

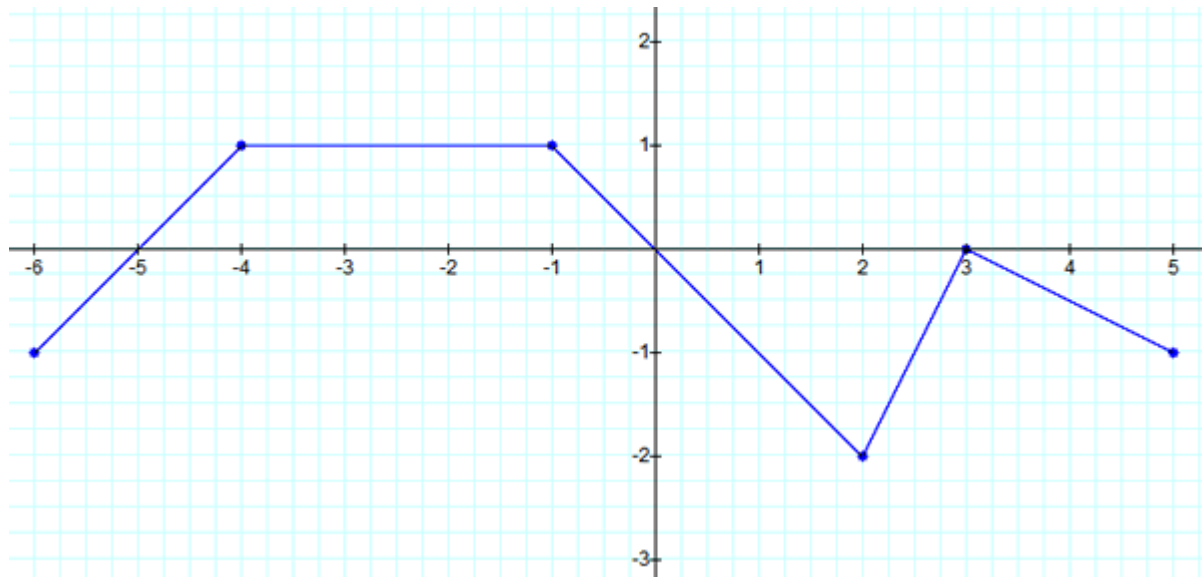


GRAPH D (below)



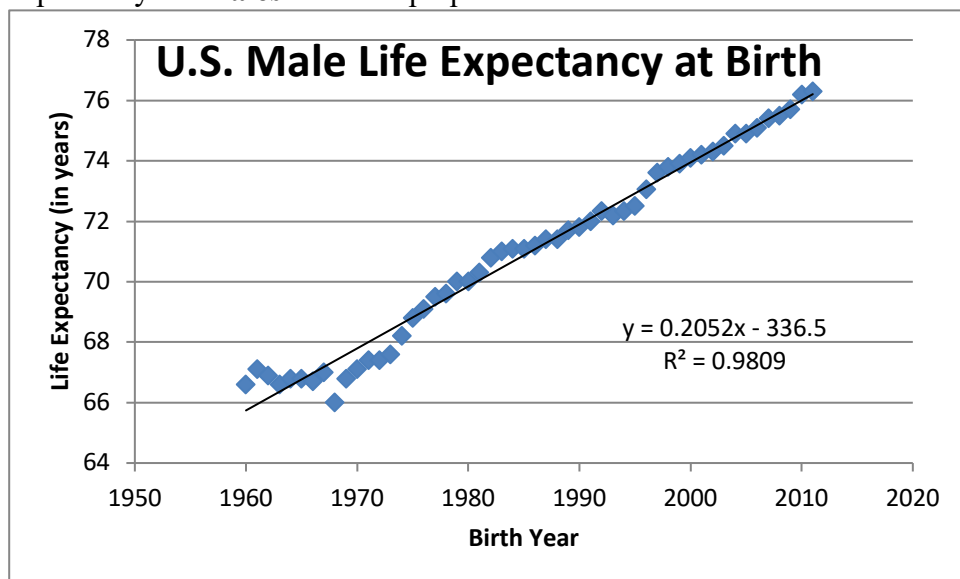
8. (20 pts, **no** explanation required)

Consider the graph of the piecewise function $y = f(x)$ pictured below.



- (a) State the value of $f(-1)$.
- (b) State the x -intercept(s), if any.
- (c) State the y -intercept(s), if any.
- (d) State the domain of the piecewise function.
- (e) State the range of the piecewise function.
- (f) State the interval(s) on which the function is increasing. That is, for what x -values is the function increasing?
- (g) State the interval(s) on which the function is decreasing. That is, for what x -values is the function decreasing?

9. (14 pts) Life expectancy at birth is the estimated lifespan of a baby born in a particular year (given the conditions of that time period). Based on data retrieved from <http://www.indexmundi.com/facts/united-states/life-expectancy-at-birth> the following chart of U.S. life expectancy for **males** has been prepared.



The regression line is $y = 0.2052x - 336.5$, where x = birth year and y = U.S. life male expectancy, in years. The value of r^2 is 0.9809.

- Use the regression line to estimate the U.S. life expectancy of a male baby born in 1970, to the nearest tenth of a year. Show some work.
- Use the regression line to predict the U.S. life expectancy of a male baby born in 2020, to the nearest tenth of a year. Show some work.
- What is the **slope** of the regression line and what are the units of measurement? In a sentence, interpret what the slope is telling us, in the context of this real-world application.
- What is the **value of the correlation coefficient, r** ? Also, **interpret its value**: Looking at the graph and the size of r , do you judge the **strength of the linear relationship** to be very strong, moderately strong, somewhat weak, or very weak?