

Algebra and Calculus: Mock Quiz 1

Name/NetID: _____

Complete all problems.

1. For **multiple choice** problems, circle the letter corresponding to the correct answer.
2. For **free response** problems, **show all work** and put a box around your final answer.

Good luck!

1. I have a function such that $(2f \circ f \circ f \circ f \circ f)(x) = 64x$. Which of the following could be the function?

- (a) $f(x) = x^2$
- (b) $f(x) = \frac{x^2}{2}$
- (c) $f(x) = 3x$
- (d) $f(x) = 32x$
- (e) $f(x) = 2x$

2. I have two functions, $f(x)$ and $g(x)$, with the following properties:

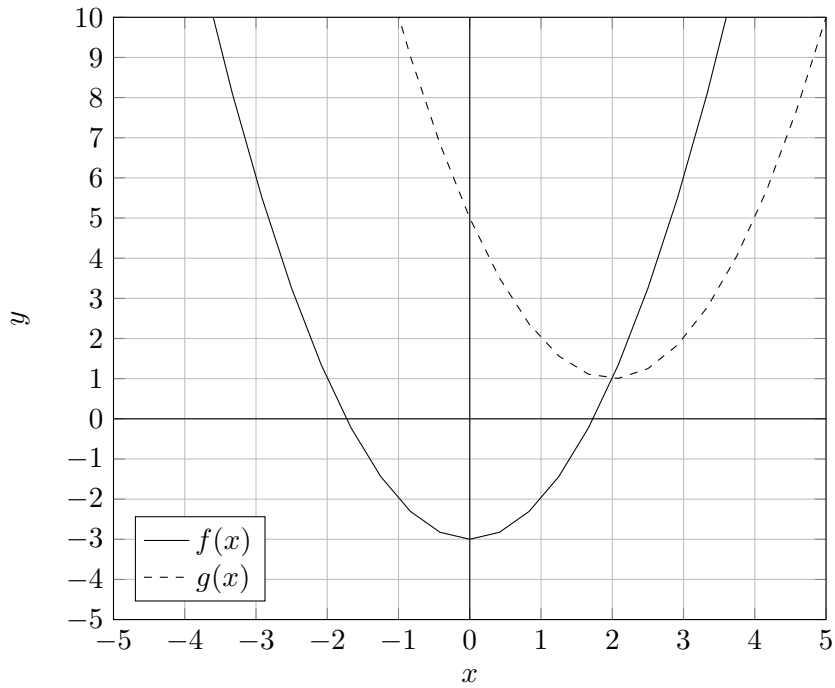
$$\begin{aligned}f(x) + g(x) &= 2x^2 - 3 \\f(x) - g(x) &= 6x + 5\end{aligned}$$

What values of x solve the equation $g(x) = 0$?

- (a) $x = \{-1, 4\}$
- (b) $x = \{-3, 2, 5, 6\}$
- (c) $x =$ all real numbers
- (d) $x = \{1, -3\}$
- (e) $x = \{2, 5\}$

Hint: Use the two equations given above to find $g(x)$, then set it equal to 0 and solve in the usual way.

3. Consider the graphs of the two functions $f(x)$ and $g(x)$ below:



Assume that $g(x)$ may be represented as $f(x)$ plus one or more shifting operations (i.e. there is no scaling involved). How would I represent $g(x)$ in terms of $f(x)$?

- (a) $g(x) = f(x + 4) - 2$
- (b) $g(x) = f(x - 2) + 4$
- (c) $g(x) = f(x + 2) - 4$
- (d) $g(x) = f(x - 2) - 4$
- (e) $g(x) = f(x + 4) + 2$

4. Say you're driving a car on a four hour trip with your friend and the distance you've traveled thus far is represented by the function:

$$s(t) = -5t^2 + 40t$$

where the distance is in miles and the time is in hours. Thus, at time $t=0$, you haven't traveled anywhere, so your distance is $s(0) = 0$. Your velocity is slowing down with time, as you start hitting traffic on your way (we've modeled the distance function such that this is true). After how many hours will your **average** velocity, taken from time $t=0$ up to the current time, hit 25 miles per hour?

- (a) 1 hour
- (b) 1.5 hours
- (c) 2 hours
- (d) 2.5 hours
- (e) 3 hours

Hint: What's another name for the the average rate of change of the distance you've traveled?

5. Xinyang and Kevin are playing cards. Xinyang initially puts in 50 dollars and Kevin puts in 20. Xinyang is not doing her best tonight, and has been losing 5 dollars per game to Kevin. Continuing this trend, Kevin and Xinyang share the same amount of money after the conclusion of game g . However, from this point on, Xinyang begins to win money back at a steady rate of 3 dollars per game. **They play 10 games in total.**

- (a) Write the piecewise function corresponding to the amount of money Kevin has as a function of the number of games he has played. Make sure you have the right domain based on the total number of games he plays.
- (b) How many games will Xinyang and Kevin have played in total before Kevin ends up with 23 dollars?

A graph is provided below if you choose to use it.

