M124
Fall 2023

Quiz 2

Name:___________

No calculators or notes allowed. Please show all your work (an answer with no justification will may not get credit).

1. Find functions f, g so that $h = f \circ g$:

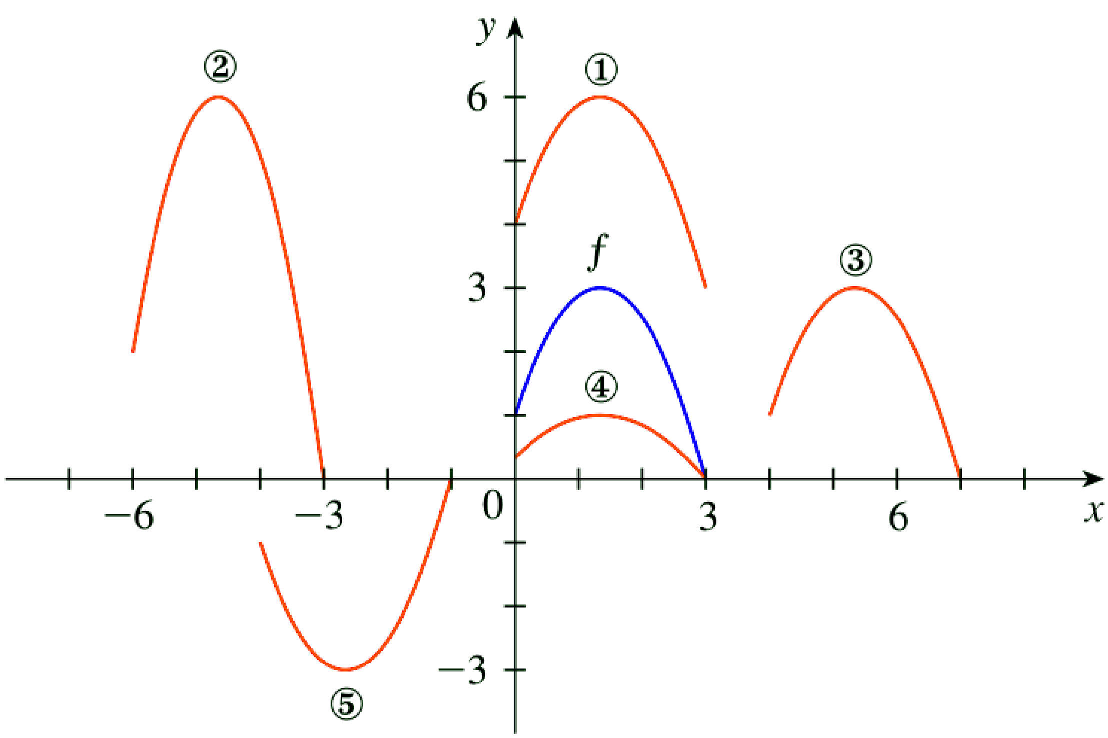
   (a) $h(x) = (2x + x^2)^3$

   (b) $h(x) = 3^{x^2+2x+1}$

2. The function $y = f(x)$ with graphs 1-5 are shown. Match each equation with its graph:

   (a) $y = f(x-4)$ (b) $y = f(x) + 3$ (c) $y = \frac{1}{3}f(x)$

   (d) $y = -f(x+4)$ (e) $y = 2f(x+6)$

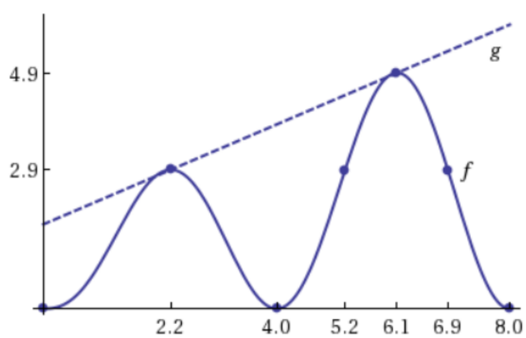


3. If $f(x) = 3x - 2$ and $g(x) = x^2 + x$, compute an expression for $f \circ g$ and $g \circ g$ (you do not need to simplify).

4. Evaluate the limit algebraically, if it exists: $\lim_{x \to 4} \frac{x^2 - 16}{x - 4} =$

5. In the graph, f is the solid curve, g is the dashed curve.

Comparing average rate of change of two functions. Consider the graphs of $f(x)$ and $g(x)$ below:



For each interval given below, decide whether the average rate of change of $f(x)$ or $g(x)$ is greater over that particular interval.

Interval	Which function has GREATER average rate of change?
$0 \le x \le 4$	(□ f □ g □ both have an equal rate of change)
$0 \le x \le 8$	(□ f □ g □ both have an equal rate of change)
$0 \le x \le 2.2$	(□ f □ g □ both have an equal rate of change)
$5.2 \le x \le 6.1$	(□ f □ g □ both have an equal rate of change)
$5.2 \le x \le 6.9$	(□ f □ g □ both have an equal rate of change)

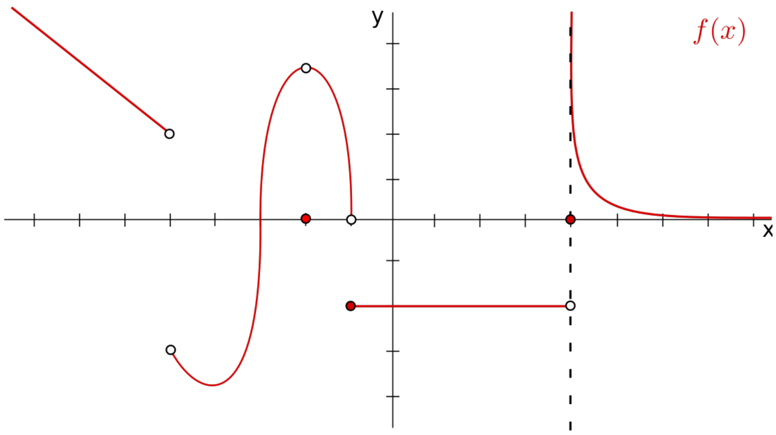
6. Let

$$f(x) = \begin{cases} x^2 - 4, & \text{if } 0 \leq x < 4 \\ 4 & \text{if } x = 4 \\ 3x - 6 & \text{if } x > 4 \end{cases}$$

Evaluate each of the quantities below. If the quantity does not exist, put DNE.

$\lim\limits_{x \to 4^+} f(x) =$ $\qquad$ $\lim\limits_{x \to 4^-} f(x) =$ $\qquad$ $f(4) =$ $\qquad$ $\lim\limits_{x \to 4} f(x) =$

7. The graph of $g(x)$ is given below (graph to scale).



Answer the following questions about g. If the quantity does not exist, put DNE.

$\lim\limits_{x \to 4^-} g(x) =$ $\qquad$ $g(4) =$ $\qquad$ $\lim\limits_{x \to -1} g(x) =$ $\qquad$ $\lim\limits_{x \to -2} g(x) =$

8. Compute $f'(1)$, if $f(x) = x^2 - 3x$. (You must use the definition of $f'(1)$ to receive credit).