**Calculator NOT Permitted**

**Multiple Choice**

| Multiple Choice | | |
|---|---|---|
| **Free Response** | | |
| **Total out of 18 points** | | |

| | |
|---|---|
| 1. | |
| 2. | |
| 3. | |
| 4. | |
| 5. | |
| 6. | |
| 7. | |
| 8. | |
| 9. | |

This reviews the second half of unit 1. Please also study quiz #1 review, each FRQ from the homework, and read over your notes.

**FREE RESPONSE**

Consider the two piece-wise defined functions, $f(x)$ and $g(x)$, below to answer the questions that follow.

$$f(x) = \begin{cases} \frac{1}{2}x^2 - x + 2, & -4 < x \leq -2 \\ \sqrt{x+6} + 4, & x > -2 \end{cases} \qquad g(x) = \begin{cases} \frac{1}{2}x + 4, & x < -4 \\ -\frac{1}{2}x, & x > -4 \end{cases}$$

a.  Using interval notation, identify the domain of both functions.

Domain of $f(x)$:_____  Domain of $g(x)$:_____

b.  Find the values of $f(-2)$ and $g(f(3))$.  Show the analysis that leads to your answers.

c.  Does $f(x)$ have a discontinuity at $x = -2$?  If so, classify the discontinuity, justifying your conclusion.

d.  Does $g(x)$ have a discontinuity at $x = -4$?  If so, classify the discontinuity, justifying your conclusion.

| **MULTIPLE CHOICE** |
| --- |

Use the graph to answer questions 1 and 2. The dashed graph is $f(x)$ and the solid graph is $g(x)$.
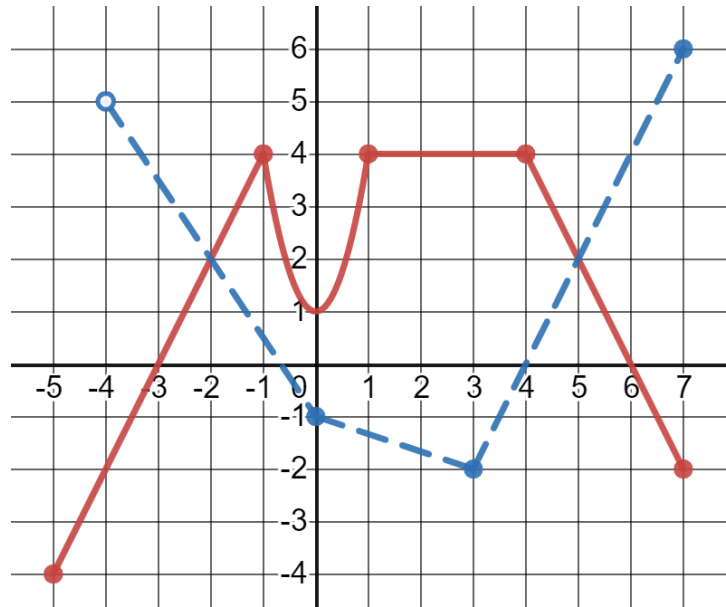


1. At which of the following values of $x$ is $f(x) < 0$ and $f(x) < g(x)$?

   I.  $x = -1$        II.  $x = 2$        III.  $x = 4$

   A.  II only
   B.  I and II only
   C.  III only
   D.  II and III only
   E.  I, II, and III

2. Which of the following best describes where the graph of $g(x) \leq 0$?

   A.  $\left[-5, -3\right] \cup \left[6, 7\right]$          B.  $\left(-3, 0\right) \cup \left(0, 6\right)$          C.  $\left(-5, -3\right] \cup \left[6, 7\right)$

   D.  $\left[-5, -3\right] \cup \left[6, 7\right]$ and $x = 0$          E.  $\left[-3, 6\right]$

3. Consider the functions $f(x) = 2x^2 + 3x - 2$ and $g(x) = x - 2$. Find an equation for $(f \cdot g)(x)$.
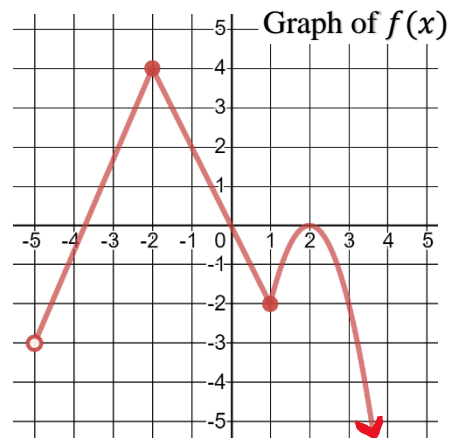
    A. $(f \cdot g)(x) = 2x^3 - x^2 - 8x + 4$

    B. $(f \cdot g)(x) = 2x^3 - 4x^2 - 5x + 4$

    C. $(f \cdot g)(x) = 2x^2 - 5x$

    D. $(f \cdot g)(x) = x^2 - 8x + 4$

    E. None of these

4. Identify the domain of the function $g(x) = \dfrac{3 - x}{x^2 - x - 20}$

    A. $(-\infty,-4) \cup (-4,3) \cup (3,5) \cup (5,\infty)$      B. $(-\infty,3) \cup (3,\infty)$

    C. $(-\infty,\infty)$      D. $(-\infty,-4) \cup (-4,5) \cup (5,\infty)$

    E. The domain cannot be determined.

5. The graph of $f(x)$ is shown to the right and $g(x) = 5 - 2x$. What is the value of $f(g(5))$?

    A. –3

    B. 7

    C. 19

    D. –2

    E. Undefined

Graph of $f(x)$
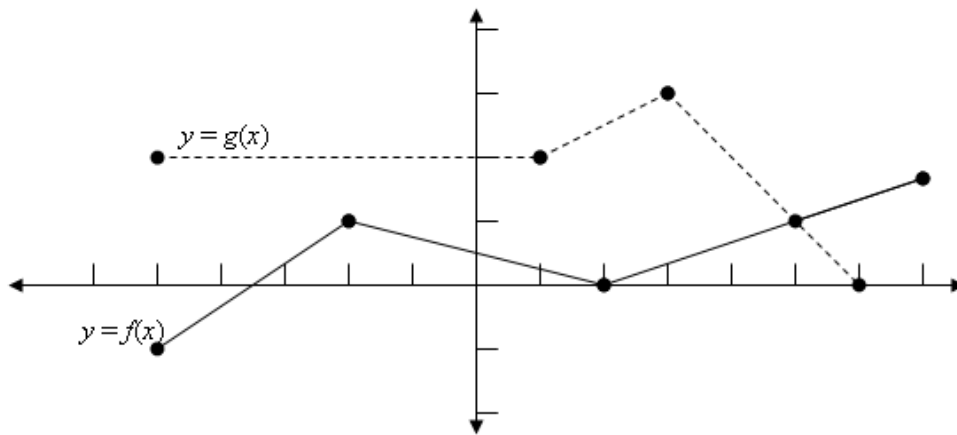
6. What is the domain of the function $f(x) = \sqrt{9 - 3x}$.

    A. $[3,\infty)$      B. $(-\infty,3)$      C. $(-\infty,3]$

    D. $(-\infty,3) \cup (3,\infty)$      E. $(3,\infty)$

7.  For what value of $a$ would the function $g(x) = \begin{cases} ax - 3, \ x < -2 \\ x^2 - 2x, \ x > -2 \end{cases}$ have a point discontinuity at $x = -2$.

A.  $a = \frac{5}{2}$

B.  $a = -\frac{11}{2}$

C.  $a = -\frac{5}{2}$

D.  $a = -\frac{3}{2}$

E.  No value of $a$ will make the function have a point discontinuity at $x = -2$.

Use the graphs of $f(x)$ and $g(x)$ pictured below to answer question 8 and 9.



8.  Which of the following statements is/are true about the graphs of $f(x)$ and $g(x)$?

      I.    $f(x)$ is increasing on the intervals $(-5, -2)$ and $(2, 7)$.

      II.    $f(x) = g(x)$ only at $x = 5$.

      III.    $f(x) > g(x)$ only on the interval $(5, 6)$.

A.  I only
B.  I and II only
C.  I, II and III
D.  II and III only
E.  II only

9.  If $p(x) = 2mx^2 - 3x$, for what value(s) of $m$ would $p(-1) = f(g(0))$?

A.  $m = -\frac{1}{2}$    B.  $m = \frac{5}{2}$    C.  $m = -\frac{3}{2}$    D.  $m = \frac{3}{2}$    E.  No value of $m$ would make $p(-1) = g(f(0))$.