1. Choose the interval below that f composed with g at $x = 1$ is in.

$$f(x) = x^3 - 1x^2 + 3x - 3 \text{ and } g(x) = -x^3 - 3x^2 - x + 3$$

A. $(f \circ g)(1) \in [-22, -17]$

B. $(f \circ g)(1) \in [-6, 0]$

C. $(f \circ g)(1) \in [-31, -27]$

D. $(f \circ g)(1) \in [3, 6]$

E. It is not possible to compose the two functions.

---

2. Determine whether the function below is 1-1.

$$f(x) = 16x^2 + 128x + 256$$

A. Yes, the function is 1-1.

B. No, because there is an x-value that goes to 2 different y-values.

C. No, because there is a y-value that goes to 2 different x-values.

D. No, because the domain of the function is not $(-\infty, \infty)$.

E. No, because the range of the function is not $(-\infty, \infty)$.

---

3. Determine whether the function below is 1-1.

$$f(x) = (6x - 30)^3$$

A. Yes, the function is 1-1.

B. No, because there is an x-value that goes to 2 different y-values.

C. No, because the domain of the function is not $(-\infty, \infty)$.

D. No, because there is a y-value that goes to 2 different x-values.

E. No, because the range of the function is not $(-\infty, \infty)$.

---

4. Multiply the following functions, then choose the domain of the resulting function from the list below.

$$f(x) = 9x^3 + 6x^2 + 9x + 9 \text{ and } g(x) = \sqrt{-3x - 7}$$

A. The domain is all Real numbers except $x = a,$ where $a \in [-4.25, -0.25]$

B. The domain is all Real numbers greater than or equal to $x = a,$ where $a \in [3.25, 4.25]$

C. The domain is all Real numbers less than or equal to $x = a,$ where $a \in [-3.33, -1.33]$

D. The domain is all Real numbers except $x = a$ and $x = b,$ where $a \in [6.2, 7.2]$ and $b \in [-12.2, -4.2]$

E. The domain is all Real numbers.

---

5. Find the inverse of the function below. Then, evaluate the inverse at $x = 10$ and choose the interval that $f^{-1}(10)$ belongs to.

$$f(x) = \ln(x - 2) + 5$$

A. $f^{-1}(10) \in [142.41, 147.41]$

B. $f^{-1}(10) \in [3269015.37, 3269026.37]$

C. $f^{-1}(10) \in [2982.96, 2989.96]$

D. $f^{-1}(10) \in [149.41, 157.41]$

E. $f^{-1}(10) \in [162756.79, 162766.79]$

---

6. Choose the interval below that f composed with g at $x = -1$ is in.

$$f(x) = -2x^3 - 4x^2 - 4x \text{ and } g(x) = x^3 + 2x^2 - x - 2$$

A. $(f \circ g)(-1) \in [12, 15]$

B. $(f \circ g)(-1) \in [17, 22]$

C. $(f \circ g)(-1) \in [-2, 2]$

D. $(f \circ g)(-1) \in [-9, -5]$

E. It is not possible to compose the two functions.

---

7. Find the inverse of the function below. Then, evaluate the inverse at $x = 8$ and choose the interval that $f^{-1}(8)$ belongs to.

$$f(x) = \ln(x - 4) - 2$$

A. $f^{-1}(8) \in [162752.79, 162759.79]$

B. $f^{-1}(8) \in [400.43, 410.43]$

C. $f^{-1}(8) \in [22026.47, 22035.47]$

D. $f^{-1}(8) \in [51.6, 54.6]$

E. $f^{-1}(8) \in [22021.47, 22023.47]$

---

8. Find the inverse of the function below (if it exists). Then, evaluate the inverse at $x = 15$ and choose the interval that $f^{-1}(15)$ belongs to.

$$f(x) = 3x^2 - 2$$

A. $f^{-1}(15) \in [1.72, 2.16]$

B. $f^{-1}(15) \in [7.7, 8.51]$

C. $f^{-1}(15) \in [2.3, 2.85]$

D. $f^{-1}(15) \in [4.85, 5.63]$

E. The function is not invertible for all Real numbers.

---

9. Find the inverse of the function below (if it exists). Then, evaluate the inverse at $x = 12$ and choose the interval the $f^{-1}(12)$ belongs to.

$$f(x) = \sqrt[3]{4x - 3}$$

A. $f^{-1}(12) \in [-433.14, -431.76]$

B. $f^{-1}(12) \in [430.43, 432.1]$

C. $f^{-1}(12) \in [-431.68, -430.43]$

D. $f^{-1}(12) \in [432.29, 434.48]$

E. The function is not invertible for all Real numbers.

---

10. Add the following functions, then choose the domain of the resulting function from the list below.

$$f(x) = \frac{4}{4x+21} \text{ and } g(x) = \frac{1}{3x-19}$$

A. The domain is all Real numbers greater than or equal to $x = a$, where $a \in [-10.4, -4.4]$

B. The domain is all Real numbers except $x = a$, where $a \in [-9.25, -0.25]$

C. The domain is all Real numbers less than or equal to $x = a$, where $a \in [3.75, 7.75]$

D. The domain is all Real numbers except $x = a$ and $x = b$, where $a \in [-9.25, -3.25]$ and $b \in [4.33, 15.33]$

E. The domain is all Real numbers.
