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

$$f(x) = \ln(x - 4) + 3$$

A. $f^{-1}(9) \in [162758.79, 162766.79]$

B. $f^{-1}(9) \in [147.41, 155.41]$

C. $f^{-1}(9) \in [442414.39, 442422.39]$

D. $f^{-1}(9) \in [404.43, 409.43]$

E. $f^{-1}(9) \in [398.43, 402.43]$

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

$$f(x) = 5x + 3 \text{ and } g(x) = 9x^2 + 3x + 8$$

A. The domain is all Real numbers less than or equal to $x = a$, where $a \in [-4.5, -0.5]$

B. The domain is all Real numbers except $x = a$, where $a \in [2.25, 13.25]$

C. The domain is all Real numbers greater than or equal to $x = a$, where $a \in [5.33, 10.33]$

D. The domain is all Real numbers except $x = a$ and $x = b$, where $a \in [-10.25, 7.75]$ and $b \in [0.8, 7.8]$

E. The domain is all Real numbers.

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

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

A. $(f \circ g)(1) \in [38, 39]$

B. $(f \circ g)(1) \in [29, 32]$

C. $(f \circ g)(1) \in [5, 11]$

D. $(f \circ g)(1) \in [-7, -1]$

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

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

$$f(x) = 5x^2 + 3$$

A. $f^{-1}(10) \in [1.61, 1.68]$

B. $f^{-1}(10) \in [7.17, 7.38]$

C. $f^{-1}(10) \in [0.86, 1.23]$

D. $f^{-1}(10) \in [3.94, 4.3]$

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

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

$$f(x) = x^3 + 7x^2 + 3x + 4 \text{ and } g(x) = \sqrt{-3x - 15}$$

A. The domain is all Real numbers less than or equal to $x = a,$ where $a \in [-10, 2]$

B. The domain is all Real numbers greater than or equal to $x = a,$ where $a \in [-6, -3]$

C. The domain is all Real numbers except $x = a,$ where $a \in [-10.25, -3.25]$

D. The domain is all Real numbers except $x = a$ and $x = b,$ where $a \in [3.33, 8.33]$ and $b \in [-10.2, -2.2]$

E. The domain is all Real numbers.

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

$$f(x) = (3x - 20)^3$$

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

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

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

D. Yes, the function is 1-1.

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

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

$$f(x) = 2x^3 + 2x^2 - 4x + 1 \text{ and } g(x) = -2x^3 + 4x^2 - x + 1$$

A. $(f \circ g)(1) \in [-12, -5]$

B. $(f \circ g)(1) \in [-2, 7]$

C. $(f \circ g)(1) \in [16, 22]$

D. $(f \circ g)(1) \in [11, 13]$

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

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8. Find the inverse of the function below (if it exists). Then, evaluate the inverse at $x = 11$ and choose the interval that $f^{-1}(11)$ belongs to.

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

A. $f^{-1}(11) \in [6.7, 6.99]$

B. $f^{-1}(11) \in [1.79, 2.1]$

C. $f^{-1}(11) \in [4.6, 4.92]$

D. $f^{-1}(11) \in [1.71, 1.91]$

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

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

$$f(x) = 36x^2 + 168x + 196$$

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

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

C. Yes, the function is 1-1.

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

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

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

$$f(x) = \ln(x + 5) - 4$$

A. $f^{-1}(7) \in [59877.14, 59886.14]$

B. $f^{-1}(7) \in [59865.14, 59874.14]$

C. $f^{-1}(7) \in [162747.79, 162755.79]$

D. $f^{-1}(7) \in [14.09, 21.09]$

E. $f^{-1}(7) \in [-0.61, 4.39]$
