1. Perform the indicated operations and reduce the result to lowest terms. Assume the variables are restricted to values that prevent division by 0.

$$\frac{2\beta - 1}{\beta^2 - \beta - 12} + \frac{3\beta + 7}{-\beta - 3}$$

A. $\frac{-3\beta^2+10\beta+27}{(\beta+3)(\beta-4)(\beta-1)}$

B. $\frac{-3\beta^2+3\beta+27}{(\beta+3)(\beta-4)}$

C. $\frac{-3\beta^2+5\beta+27}{(\beta+3)(\beta-4)(\beta-1)}$

D. $\frac{-3\beta^2+7\beta+27}{(\beta+3)(\beta-4)}$

E. $\frac{-3\beta^2+2\beta+27}{(\beta+3)(\beta-4)(\beta-1)}$

F. $\frac{-3\beta^2+4\beta+27}{(\beta+3)(\beta-4)}$

G. $\frac{-3\beta^2+8\beta+27}{(\beta+3)(\beta-4)(\beta-1)}$

H. $\frac{-3\beta^2+12\beta+27}{(\beta+3)(\beta-4)}$

2. Solve the radical equation.

$$\sqrt{9\phi + 4} + 5 = 3$$

A. $\phi = -\frac{3}{4}$

B. $\phi = -\frac{3}{5}$

C. This equation has no real solution.

D. $\phi = -\frac{1}{4}$

E. 0

F. $\phi = -\frac{1}{2}$

G. $\phi = -\frac{4}{5}$

H. $\phi = \frac{4}{5}$

3. Evaluate the radical expression.

$$2\sqrt{5\alpha} + 5\sqrt{5\alpha}$$

A. $8\sqrt{10\alpha}$

B. $3\sqrt{10\alpha}$

C. $7\sqrt{10\alpha}$

D. $7\sqrt{5\alpha}$

E. $12\sqrt{10\alpha}$

F. $8\sqrt{5\alpha}$

G. $12\sqrt{5\alpha}$

H. $3\sqrt{5\alpha}$

4. Solve the rational equation. Be sure to check for extraneous solutions.

$$\frac{\tau+1}{\tau}+\frac{14}{\tau-7}=\frac{4\tau-7}{\tau^2-7\tau}$$

A. $\tau = 1$

B. This equation has no solution.

C. $\tau = 0$ or $\tau = 1$

D. $\tau = 0$ or $\tau = -1$

E. $\tau = 0$

F. $\tau = -4$

G. $\tau = -1$

H. $\tau = 0$ or $\tau = -4$

5. Carbon-14 decays continuously at the rate of 0.01245% per year. An archaeologist has determined that only 3% of the original carbon-14 from a plant specimen remains. Estimate the age of this specimen.

A. The specimen is approximately 28154.12 years old.

B. The specimen is approximately 28261.12 years old.

C. The specimen is approximately 28165.12 years old.

D. The specimen is approximately 28106.12 years old.

E. The specimen is approximately 28193.12 years old.

F. The specimen is approximately 28118.12 years old.

G. The specimen is approximately 28173.12 years old.

H. The specimen is approximately 28067.12 years old.

6. Find the exact solution to the equation.

$$7.55e^{0.9h} = 7.02$$

A. $h = -\frac{1}{0.9}\frac{\ln(7.02)}{\ln(7.55)}$

B. $h = \frac{1}{0.9}\ln(\frac{7.02}{7.55})$

C. $h = -\frac{1}{0.9}\frac{\ln(7.55)}{\ln(7.02)}$

D. $h = \frac{1}{0.9}\frac{\ln(7.55)}{\ln(7.02)}$

E. $h = -\frac{1}{0.9}\ln(\frac{7.02}{7.55})$

F. $h = \frac{1}{0.9}\frac{\ln(7.02)}{\ln(7.55)}$

G. $h = -\frac{1}{0.9}\ln(\frac{7.55}{7.02})$

H. $h = \frac{1}{0.9}\ln(\frac{7.55}{7.02})$

7. Use an augmented matrix and elementary row operations to solve the system of linear equations.

$$\left\{ \begin{array}{c} 3y = 3 \\ 2x - y - 2z = 1 \\ 3x = -3 \end{array} \right\}$$

A. $x = -\frac{5}{2}$, $y = \frac{4}{3}$, $z = -2$

B. $x = -1$, $y = -\frac{1}{2}$, $z = -\frac{7}{3}$

C. $x = -1$, $y = 1$, $z = -2$

D. $x = -\frac{5}{2}$, $y = -\frac{1}{2}$, $z = -\frac{7}{2}$

E. $x = -\frac{5}{2}$, $y = 1$, $z = -\frac{3}{2}$

F. $x = -1$, $y = 1$, $z = -\frac{7}{2}$

G. $x = -\frac{5}{2}$, $y = -\frac{1}{2}$, $z = -\frac{5}{3}$

H. $x = -1$, $y = \frac{4}{3}$, $z = -\frac{5}{3}$

8. Reduce the rational expression $\frac{49n^2-16}{36+63n}$ to lowest terms. Assume that the variables are restricted to values that prevent division by 0.

A. $\frac{7n-4}{9}$

B. $-\frac{2j-5u}{8}$

C. $-\frac{8}{2j-5u}$

D. $-\frac{7n-4}{9}$

E. $-\frac{9}{7n-4}$

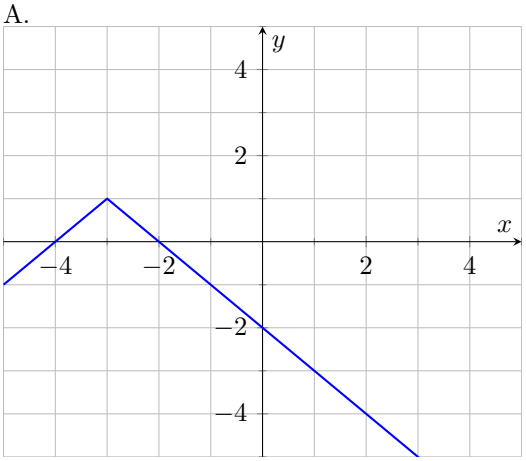
F. $\frac{9}{7n-4}$

G. $\frac{7n-4}{2j-5u}$

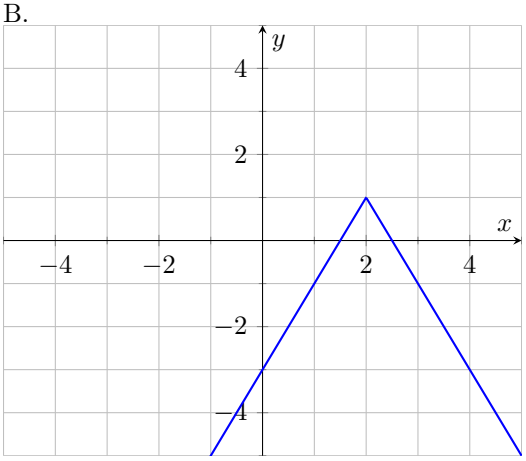
H. $\frac{2j-5u}{7n-4}$

9. Use transformations to graph the function. $f(x) = -2|x - 2| + 1$.

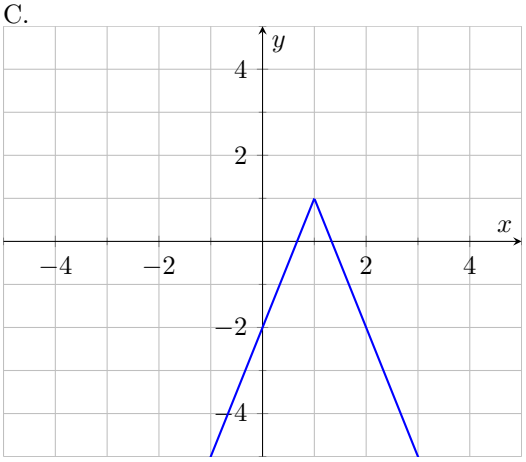
A.



B.

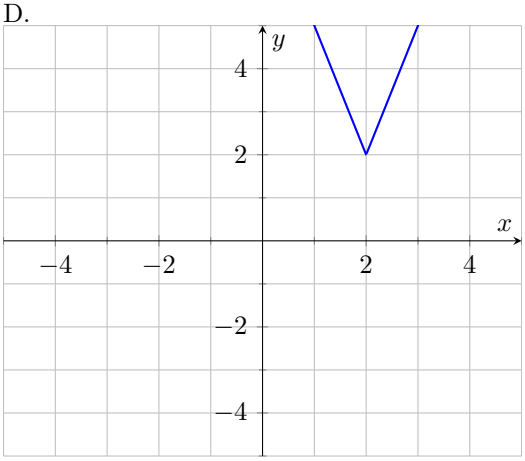


C.

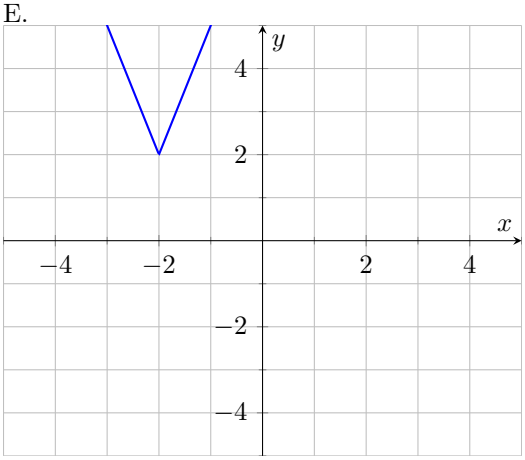


MORE OPTIONS ON NEXT PAGE

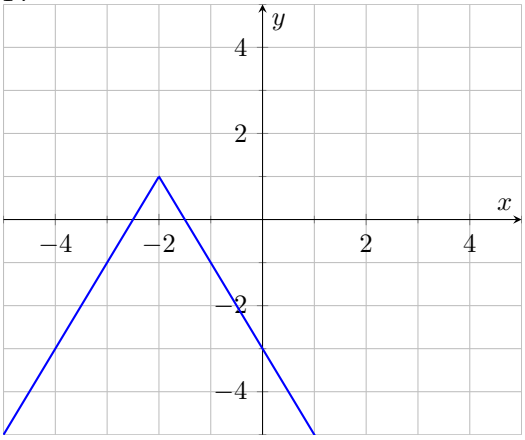
D.



E.



F.



10. Use the change of base formula to evaluate the following logarithm. Round your answer to the nearest hundredth.

$$\log_{\frac{1}{2}} 11$$

A. -3.59

B. -4.32

C. -3.93

D. -3.46

E. -4.14

F. -3.7

G. -3.41

H. -3.32

11. Solve the quadratic equation. Leave the radical unsimplified. $5z^2 = -2z + 9$

A. This equation has no real number solutions.

B. $z = \frac{2 \pm \sqrt{260}}{-10}$

C. $z = \frac{2 \pm \sqrt{136}}{10}$

D. $z = \frac{2 \pm \sqrt{151}}{10}$

E. $z = \frac{-2 \pm \sqrt{47}}{10}$

F. $z = \frac{-2 \pm \sqrt{144}}{10}$

G. $z = \frac{-2 \pm \sqrt{184}}{10}$

H. $z = \frac{2 \pm \sqrt{265}}{-10}$

12. Find the exact solution to the logarithmic equation.

$$\log(6\zeta + 3) = 2$$

A. $\zeta = \frac{101}{6}$

B. $\zeta = \frac{95}{6}$

C. $\zeta = \frac{109}{6}$

D. $\zeta = \frac{97}{6}$

E. $\zeta = \frac{53}{3}$

F. $\zeta = \frac{103}{6}$

G. $\zeta = \frac{44}{3}$

H. $\zeta = \frac{85}{6}$

13. Consider the functions $f(x) = |x|$ and $g(x) = 6x + 4$. Find $f \circ g$.

A. $(f \circ g)(x) = |6x| - 4$

B. $(f \circ g)(x) = 6|x| + 4$

C. $(f \circ g)(x) = |6x| - |4|$

D. $(f \circ g)(x) = |6x - 4|$

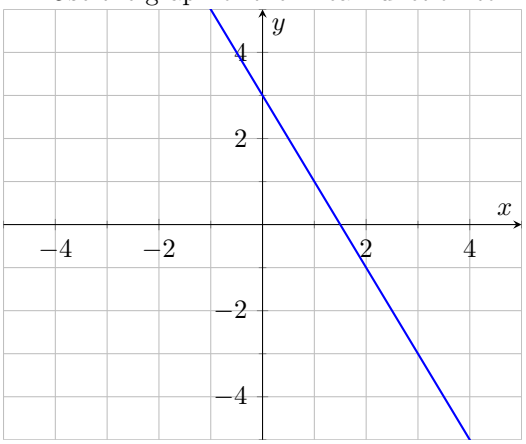
E. $(f \circ g)(x) = 6|x| - 4$

F. $(f \circ g)(x) = |6x| + |4|$

G. $(f \circ g)(x) = |6x + 4|$

H. $(f \circ g)(x) = |6x| + 4$

14. Use the graph of the linear function to find interval(s) where the function increasing.



A. The function $f(x)$ is increasing on $\emptyset$

B. The function $f(x)$ is increasing on $(-\infty, 3)$

C. The function $f(x)$ is increasing on $(3, \infty)$

D. The function $f(x)$ is increasing on $(-\infty, 1.5) \cup (3, \infty)$

E. The function $f(x)$ is increasing on $(3, 1.5)$

F. The function $f(x)$ is increasing on $(-\infty, 3) \cup (1.5, \infty)$

G. The function $f(x)$ is increasing on $\mathbb{R}$

H. The function $f(x)$ is increasing on $(-\infty, 1.5)$

15. Represent each expression by using radical notation, and evaluate the expression.

$$(0.16)^{\frac{1}{2}}$$

A. $\sqrt[3]{0.16} = \frac{23}{20}$

B. $\sqrt{0.16} = \frac{1}{5}$

C. $\frac{1}{\sqrt[3]{0.16}} = \frac{23}{20}$

D. $\frac{1}{\sqrt{0.16}} = \frac{2}{5}$

E. $\sqrt{0.16} = \frac{2}{5}$

F. $\frac{1}{\sqrt[3]{0.16}} = \frac{12}{5}$

G. $\sqrt[3]{0.16} = \frac{12}{5}$

H. $\frac{1}{\sqrt{0.16}} = \frac{1}{5}$

16. Perform the indicated operations and reduce the result to lowest terms. Assume the variables are restricted to values that prevent division by 0.

$$\frac{\frac{1}{\alpha^2} - \frac{1}{n^2}}{\frac{1}{\alpha} - \frac{1}{n}}$$

A. $-\frac{\alpha(\alpha+n)}{(\alpha-n)^2}$

B. $\frac{n}{\alpha}$

C. $\frac{1}{\alpha n}$

D. $-\frac{\alpha+n}{\alpha}$

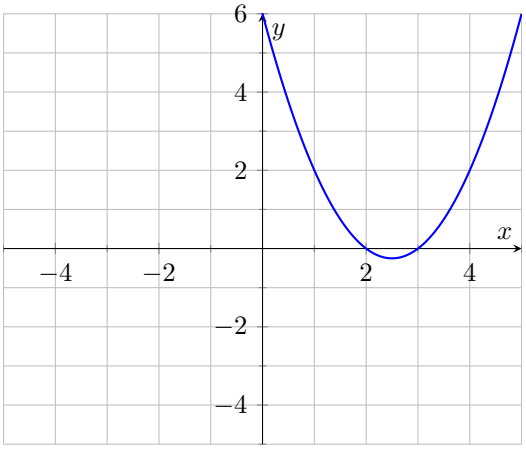
E. $\frac{\alpha+n}{\alpha n}$

F. $\frac{\alpha+n}{\alpha^2 n^2}$

G. $\frac{1}{\alpha-n}$

H. 1

17. Find the y-intercept, x-intercepts, and range of the parabola graphed below.



A. The y-intercept is $(0, 8)$. The x-intercepts are $(4, 0)$ and $(3, 0)$. The range is $R = (-\infty, \frac{7}{4}]$.

B. The y-intercept is $(0, 6)$. The x-intercepts are $(4, 0)$ and $(5, 0)$. The range is $R = (-\infty, \frac{7}{4}]$.

C. The y-intercept is $(0, 8)$. The x-intercepts are $(2, 0)$ and $(5, 0)$. The range is $R = (-\infty, \frac{7}{4}]$.

D. The y-intercept is $(0, 6)$. The x-intercepts are $(2, 0)$ and $(3, 0)$. The range is $R = [-\frac{1}{4}, \infty)$.

E. The y-intercept is $(0, 6)$. The x-intercepts are $(4, 0)$ and $(5, 0)$. The range is $R = [\frac{7}{4}, \infty)$.

F. The y-intercept is $(0, 8)$. The x-intercepts are $(4, 0)$ and $(5, 0)$. The range is $R = [-\frac{1}{4}, \infty)$.

G. The y-intercept is $(0, 8)$. The x-intercepts are $(2, 0)$ and $(5, 0)$. The range is $R = [\frac{7}{4}, \infty)$.

H. The y-intercept is $(0, 8)$. The x-intercepts are $(4, 0)$ and $(5, 0)$. The range is $R = (-\infty, -\frac{1}{4}]$.

18. Simplify the division. Rationalize the denominator only if this step is necessary.

$$\frac{\sqrt[3]{25}}{\sqrt[3]{16}}$$

A. $\frac{2\sqrt[3]{100}}{5}$

B. $\frac{\sqrt[3]{100}}{25}$

C. 4

D. $\frac{4}{\sqrt[3]{100}}$

E. $\frac{5\sqrt[3]{100}}{2}$

F. $\frac{\sqrt[3]{100}}{4}$

G. 25

H. $\frac{25}{\sqrt[3]{100}}$

19. Perform the indicated operations and reduce the result to lowest terms. Assume the variables are restricted to values that prevent division by 0.

$$\frac{21\varphi s}{15\varphi^2 + 15\varphi s} \cdot \frac{\varphi^4 - s^4}{-5\varphi - 7s} \cdot \frac{5\varphi + 7s}{4\varphi^2 + 4s^2}$$

A. $\frac{20}{7s(\varphi - s)}$

B. $-\frac{20}{7s(\varphi - s)}$

C. $\frac{7s(\varphi - s)}{20}$

D. $\frac{1}{4\varphi(\varphi - s)}$

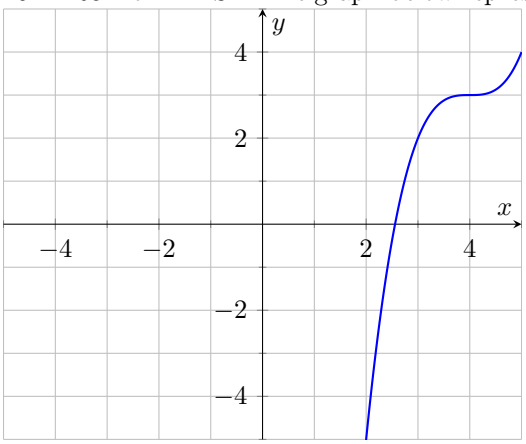
E. $-\frac{1}{4\varphi(\varphi - s)}$

F. $-\frac{\varphi}{4\varphi(\varphi - s)}$

G. $\frac{\varphi}{4\varphi(\varphi - s)}$

H. $-\frac{7s(\varphi - s)}{20}$

20. TRUE or FALSE: The graph below represents a one-to-one function. (Hint: use the horizontal line test.)



A. True

B. False

Answers

1. D.
2. C.
3. D.
4. F.
5. C.
6. B.
7. C.
8. A.
9. B.
10. D.
11. G.
12. D.
13. G.
14. A.
15. E.
16. E.
17. D.
18. F.
19. H.
20. A.