1. Consider the rational function $f(x) = \frac{6x+3}{2x+6}$. Evaluate $f(4)$.

A. $f(4) = \frac{61}{28}$

B. $f(4) = Undefined$

C. $f(4) = \frac{41}{14}$

D. $f(4) = \frac{109}{42}$

E. $f(4) = \frac{13}{14}$

F. $f(4) = \frac{27}{14}$

G. $f(4) = \frac{55}{14}$

H. $f(4) = \frac{19}{28}$

2. The function $f(x) = \frac{2}{3}x - 1$ is best described as

A. a rational function whose graph is a line.

B. a rational function whose graph is a parabola.

C. not a rational function, but a square root function.

D. a rational function whose graph will have a vertical asymptote.

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

$$\frac{3\varphi - 7}{3\varphi^2 + 26\varphi - 77} \cdot \frac{-77\varphi - 35}{3\varphi^2 - 16\varphi + 21} \cdot \frac{-3\varphi^2 + 2\varphi + 21}{11\varphi + 5}$$

A. $\frac{7(3\varphi+7)}{(3\varphi-7)(\varphi+11)}$

B. $-\frac{7(3\varphi+7)}{(3\varphi-7)(\varphi+11)}$

C. $-\frac{(3\varphi+7)(\varphi+11)}{11(3\varphi-7)}$

D. $-\frac{11(3\varphi-7)}{(3\varphi+7)(\varphi-11)}$

E. $-\frac{(3\varphi-7)(\varphi-11)}{7(3\varphi+7)}$

F. $\frac{11(3\varphi-7)}{(3\varphi+7)(\varphi-11)}$

G. $\frac{(3\varphi-7)(\varphi-11)}{7(3\varphi+7)}$

H. $\frac{(3\varphi+7)(\varphi+11)}{11(3\varphi-7)}$

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

$$\frac{-6v^5}{-6} \cdot \frac{-6}{8v^7}$$

A. $-\frac{3}{4v^2}$

B. $\frac{v^4}{20}$

C. $-8v$

D. $-\frac{75v^2}{8}$

E. $\frac{2v}{45}$

F. $\frac{1}{6v^3}$

G. $\frac{20v^2}{3}$

H. $2v$

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

$$\frac{2r+5}{r^2-7r+6}+\frac{r-2}{-r+1}$$

A. $\frac{-r^2+6r-7}{(r-1)(r-6)}$

B. $\frac{-r^2+16r-7}{(r-1)(r-6)}$

C. $\frac{-r^2+15r-7}{(r-1)(r-3)(r-1)}$

D. $\frac{-r^2+8r-7}{(r-1)(r-3)(r-1)}$

E. $\frac{-r^2+9r-7}{(r-1)(r-3)(r-1)}$

F. $\frac{-r^2+3r-7}{(r-1)(r-6)}$

G. $\frac{-r^2+11r-7}{(r-1)(r-3)(r-1)}$

H. $\frac{-r^2+10r-7}{(r-1)(r-6)}$

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

$$\frac{5\mu+1}{\mu^2-8\mu+7}+\frac{2\mu-7}{\mu^2-11\mu+28}$$

A. $\frac{7\mu^2-24\mu+3}{(\mu-7)(\mu-1)(\mu-1)}$

B. $\frac{7\mu^2-21\mu+3}{(\mu-7)(\mu-1)(\mu-4)}$

C. $\frac{7\mu^2-30\mu+3}{(\mu-7)(\mu-1)(\mu-4)}$

D. $\frac{7\mu^2-28\mu+3}{(\mu-7)(\mu-1)(\mu-4)}$

E. $\frac{7\mu^2-35\mu+3}{(\mu-7)(\mu-1)(\mu-1)}$

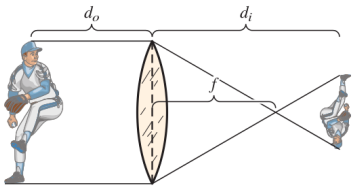
F. $\frac{7\mu^2-23\mu+3}{(\mu-7)(\mu-1)(\mu-4)}$

G. $\frac{7\mu^2-29\mu+3}{(\mu-7)(\mu-1)(\mu-1)}$

H. $\frac{7\mu^2-31\mu+3}{(\mu-7)(\mu-1)(\mu-1)}$

7. Lens Formula The relationship between the focal length f of a lens, the distance d_o of an object from the lens, and the distance d_i of an image from the lens is $\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$. So

$$f = \frac{1}{\frac{1}{d_o} + \frac{1}{d_i}}.$$



Determine f when d_o =9 ft and d_i =0.5 ft. Round your answer to the nearest thousandth.

A. $f = 0.296$ ft

B. $f = 0.198$ ft

C. $f = 0.574$ ft

D. $f = 0.392$ ft

E. $f = 0.474$ ft

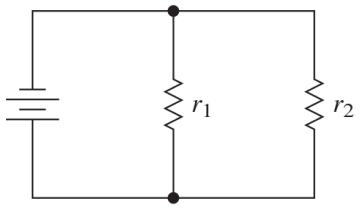
F. $f = 0.718$ ft

G. $f = 0.099$ ft

H. $f = 0.679$ ft

8. Electrical Resistance The total resistance R in a parallel circuit with two individual resistors r_1 and r_2 can be calculated by using the formula $\frac{1}{R} = \frac{1}{r_1} + \frac{1}{r_2}$. So

$$R = \frac{1}{\frac{1}{r_1} + \frac{1}{r_2}}.$$



Determine R when r_1 =54 Ω and r_2 =51 Ω

A. $R = \frac{928}{45}$ Ω

B. $R = \frac{918}{35}$ Ω

C. $R = \frac{272}{11}$ Ω

D. $R = \frac{1855}{88}$ Ω

E. $R = \frac{1392}{53}$ Ω

F. $R = \frac{96}{11}$ Ω

G. $R = \frac{708}{71}$ Ω

H. $R = \frac{2065}{94}$ Ω

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

$$\frac{\gamma}{\gamma^2 - 2\gamma - 8} - \frac{\gamma}{\gamma^2 + 10\gamma + 16} = \frac{6\gamma}{\gamma^2 + 4\gamma - 32}$$

A. $\gamma = 0$ or $\gamma = \frac{4}{5}$

B. $\gamma = 0$ or $\gamma = 2$

C. $\gamma = 1$

D. $\gamma = 0$ or $\gamma = -\frac{2}{3}$

E. This equation has no solution.

F. $\gamma = 0$

G. $\gamma = -2$

H. $\gamma = -\frac{1}{2}$

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

$$\frac{1}{k^2-6k+8}-\frac{1}{k^2+2k-24}+\frac{8}{k^2+4k-12}=0$$

A. This equation has no solution.

B. $k=0$ or $k=5$

C. $k=\frac{19}{5}$

D. $k=3$

E. $k=5$

F. $k=0$ or $k=3$

G. $k=0$ or $k=\frac{18}{5}$

H. $k=\frac{18}{5}$

11. Algebraically determine the domain D of the function $f(x)$.

$$f(x) = 3x^2 - 7$$

A. $D = \mathbb{R} \backslash \{\frac{3}{7}\}$

B. $D = [\frac{3}{7}, \infty)$

C. $D = (-\infty, \frac{3}{7}]$

D. $D = \emptyset$

E. $D = [\sqrt{\frac{7}{3}}, \infty)$

F. $D = (-\infty, \sqrt{\frac{7}{3}}]$

G. $D = \mathbb{R}$

H. $D = \mathbb{R} \backslash \{\sqrt{\frac{7}{3}}\}$

12. Algebraically determine the domain D of the function $f(x)$.

$$f(x) = \frac{1}{2x - 4}$$

A. $D = [\frac{1}{2}, \infty)$

B. $D = [2, \infty)$

C. $D = \mathbb{R} \backslash \{\frac{1}{2}\}$

D. $D = \mathbb{R}$

E. $D = (-\infty, 2]$

F. $D = \mathbb{R} \backslash \{2\}$

G. $D = (-\infty, \frac{1}{2}]$

H. $D = \emptyset$

13. Evaluate the radical expression.

$$8\sqrt[4]{19} + 9\sqrt[4]{19} - 7\sqrt[4]{19}$$

A. $13\sqrt[5]{19}$

B. $10\sqrt[5]{19}$

C. $9\sqrt[4]{19}$

D. $5\sqrt[4]{19}$

E. $10\sqrt[4]{19}$

F. $9\sqrt[5]{19}$

G. $13\sqrt[4]{19}$

H. $5\sqrt[5]{19}$

14. Evaluate the radical expression.

$$2\sqrt[5]{7\gamma} - 3\sqrt[5]{7\gamma} + 8\sqrt[5]{7\gamma}$$

A. $1\sqrt[5]{21\gamma}$

B. $7\sqrt[5]{21\gamma}$

C. $16\sqrt[5]{21\gamma}$

D. $7\sqrt[5]{7\gamma}$

E. $1\sqrt[5]{7\gamma}$

F. $3\sqrt[5]{21\gamma}$

G. $16\sqrt[5]{7\gamma}$

H. $3\sqrt[5]{7\gamma}$

15. Perform the indicated multiplication and simplify the product. Assume that the variables represent nonnegative real numbers, so that absolute value notation is not necessary.

$$3\sqrt{\kappa}(4\sqrt{\kappa} - 2)$$

A. $12\sqrt{\kappa} - 6\kappa$

B. $12\kappa - 6$

C. $\frac{6}{\sqrt{\kappa}}$

D. $12\sqrt{2\kappa} - 6\sqrt{\kappa}$

E. 6κ

F. $12\kappa - 6\sqrt{\kappa}$

G. $6\sqrt{\kappa}$

H. $12\sqrt{\kappa} - 6$

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

$$\frac{\sqrt{143}}{\sqrt{11}}$$

A. $\frac{\sqrt{143}}{13}$

B. $\frac{\sqrt{11}}{\sqrt{13}}$

C. $\frac{\sqrt{11}}{13}$

D. $\frac{\sqrt{143}}{\sqrt{13}}$

E. $\frac{11\sqrt{11}}{13}$

F. $\frac{\sqrt{13}}{11}$

G. $\sqrt{11}$

H. $\sqrt{13}$

17. Solve the radical equation.

$$\sqrt{2\omega + 6} - 4 = 8$$

A. $\omega = 69$

B. This equation has no real solution.

C. $\omega = \frac{344}{5}$

D. $\omega = \frac{347}{5}$

E. $\omega = \frac{208}{3}$

F. $\omega = \frac{137}{2}$

G. $\omega = \frac{209}{3}$

H. $\omega = \frac{273}{4}$

18. Solve the radical equation.

$$\sqrt[3]{p} = 5$$

A. $p = 125$

B. $p = 121$

C. This equation has no real solution.

D. $p = 133$

E. $p = 126$

F. $p = 127$

G. $p = 130$

H. $p = 116$

19. Simplify the expression. Assume that all variables represent positive real numbers.

$$\left(\frac{81j^{\frac{4}{3}}}{625j^{\frac{3}{4}}}\right)^{\frac{3}{4}}$$

A. $\frac{27j^{\frac{99}{80}}}{27}$

B. $\frac{125j^{\frac{11}{16}}}{8}$

C. $\frac{125j^{\frac{39}{16}}}{125}$

D. $\frac{125j^{\frac{57}{16}}}{8}$

E. $\frac{27j^{\frac{189}{80}}}{125}$

F. $\frac{125j^{\frac{29}{16}}}{27}$

G. $\frac{27j^{\frac{7}{16}}}{125}$

H. $\frac{27j^{\frac{25}{16}}}{8}$

20. Perform the indicated multiplication and simplify the product. Assume that the variables represent nonnegative real numbers, so that absolute value notation is not necessary.

$$5p^{\frac{1}{2}}(7p^{\frac{1}{2}} - 2)$$

A. $35p - 10$

B. $35p^{\frac{1}{2}} - 10$

C. $\frac{25}{p^{\frac{1}{2}}}$

D. $25p$

E. $35p^{\frac{1}{2}} - 10p$

F. $25p^{\frac{1}{2}}$

G. $35(2p)^{\frac{1}{2}} - 10p^{\frac{1}{2}}$

H. $35p - 10p^{\frac{1}{2}}$

Answers

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