Tan.ApplCalcBrf9-ch01sec02

1. Rationalize the numerator of the expression.

$$\frac{\sqrt[7]{y^5}}{x}$$

A. $\dfrac{y}{x + \sqrt[7]{y^2}}$

B. $\dfrac{y}{x\sqrt[7]{y^2}}$

C. $\dfrac{y}{x\sqrt[7]{y^5}}$

D. $\dfrac{yx}{\sqrt[7]{y^2}}$

E. $\dfrac{y^2}{x\sqrt[7]{y^2}}$

2. Rationalize the denominator of the expression.

$$\frac{a}{3 - \sqrt{a}}$$

A. $\dfrac{a(3 - \sqrt{a})}{9 - a}$

B. $\dfrac{a(3 - \sqrt{a})}{9 + a}$

C. $\dfrac{a(3 + \sqrt{a})}{9 + a}$

D. $\dfrac{(3 + \sqrt{a})}{9 - a}$

E. $\dfrac{a(3 + \sqrt{a})}{9 - a}$

3. Rationalize the denominator of the expression.

$$\frac{\left(7 + \sqrt{a}\right)}{\left(7 - \sqrt{a}\right)}$$

$$\frac{\left(7 - \sqrt{a}\right)^2}{\left(49 - a\right)}$$

A.

$$\frac{\left(7 + \sqrt{a}\right)^2}{\left(49 - a\right)}$$

B.

$$\frac{\left(7 + \sqrt{a}\right)^2}{\left(49 + a\right)}$$

C.

$$\frac{\left(7 - \sqrt{a}\right)}{\left(49 + a\right)}$$

D.

$$\frac{\left(7 - \sqrt{a}\right)^2}{\left(49 + a\right)}$$

E.

4. Perform the indicated operations and simplify the expression.

$$\frac{\dfrac{2}{x} + \dfrac{3}{y}}{1 - \dfrac{4}{xy}}$$

A. $\dfrac{3y - 2x}{xy + 4}$

B. $\dfrac{3x + 2y}{xy}$

C. $\dfrac{3x + 2y}{xy - 4}$

D. $\dfrac{3y + 2x}{xy - 4}$

E. $\dfrac{3x - 2y}{xy - 4}$

5. Simplify the expression.

$$\frac{x^3 - x^2 - 2x}{-2x^2 + 3x + 2}$$

A. $-\dfrac{x(x + 1)}{2x + 1}$

B. $\dfrac{x(x + 1)}{2x + 1}$

C. $-\dfrac{x^2 + 1}{2x + 1}$

D. $-\dfrac{x^2 - 1}{2x + 1}$

E. $-\dfrac{x(x - 1)}{2x + 1}$

6. Find the real roots of the equation by factoring.

$$\frac{1}{4}x^2 + x - 8 = 0$$

A. $x = 8, -4$
B. $x = 4$
C. $x = 4, -8$
D. $x = -8$
E. $x = 4, 8$

7. Perform the indicated operations and simplify the expression.

$$7x^2(4x^2 + 1)^4(9x) + (4x^2 + 1)^5(3x)$$

A. $9x(25x^2 + 1)(4x^2 + 1)^4$

B. $3x(25x^2 + 1)(4x^2 + 1)^4$

C. $3x(25x^2 + 1)^2(4x^2 + 1)^3$

D. $3x(4x^2 + 1)(25x^2 + 1)^4$

E. $3x(25x^2 + 2)(4x^2 + 1)^4$

8. Rationalize the numerator of the expression.

$$\frac{2 - \sqrt{7}}{7}$$

A. $-\dfrac{5}{14\left(2 + \sqrt{7}\right)}$

B. $\dfrac{3}{7\left(2 + \sqrt{7}\right)}$

C. $\dfrac{2}{7\left(2 + \sqrt{7}\right)}$

D. $-\dfrac{2}{7\left(2 + \sqrt{7}\right)}$

E. $-\dfrac{3}{7\left(2 + \sqrt{7}\right)}$

9. Rationalize the numerator of the expression.

$$\frac{6 + \sqrt{x + 5}}{\sqrt{x + 5}}$$

A.
$$\frac{x + 31}{\sqrt{x + 5}\left(6 - \sqrt{x + 5}\right)}$$

B.
$$-\frac{x - 93}{\sqrt{x + 5}\left(12 + \sqrt{x + 5}\right)}$$

C.
$$-\frac{x - 31}{\sqrt{x + 5}\left(6 - \sqrt{x + 5}\right)}$$

D.
$$-\frac{x - 62}{\left(6 - \sqrt{x + 5}\right)}$$

E.
$$\frac{x + 36}{(x + 5)\left(6 - \sqrt{x + 5}\right)}$$

10. Rationalize the denominator of the expression.

$$\frac{1}{\sqrt{5x} - 6\sqrt{y}}$$

A.
$$\frac{\sqrt{5x} + 6\sqrt{y}}{5y - 36x}$$

B.
$$\frac{\sqrt{5x} + 6\sqrt{y}}{5x - 36y}$$

C.
$$\frac{\sqrt{5x} + \sqrt{6y}}{5y + 36x}$$

D.
$$\frac{\sqrt{5x} - 6\sqrt{y}}{5x + 6y}$$

E.
$$\frac{\sqrt{5x} - 36\sqrt{y}}{5x - 36y}$$

11. Perform the indicated operations and simplify the expression.

$$\frac{2x(x+7)^{-\frac{1}{2}} - (x+7)^{\frac{1}{2}}}{x^2}$$

A. $\dfrac{x-7}{x^2(x+14)}$

B. $\dfrac{x+7}{x^2\sqrt{x+9}}$

C. $\dfrac{x-7}{x^2\sqrt{x+7}}$

D. $\dfrac{x+7}{x^2\sqrt{x+7}}$

E. $\dfrac{-7x}{x\sqrt{x+7}}$

12. Perform the indicated operations and simplify the expression.

$$\frac{10x^2 + 39x - 4}{2x + 14} \div \frac{x^2 - 16}{x^2 + 3x - 28}$$

A. $\dfrac{8x-1}{4}$

B. $\dfrac{8x-5}{3}$

C. $\dfrac{11x-8}{4}$

D. $\dfrac{10x-1}{2}$

E. $\dfrac{9x-5}{2}$

13. Perform the indicated operations and simplify the expression.

$$\frac{1 + \dfrac{1}{x}}{1 - \dfrac{2}{x}}$$

A. $\dfrac{x+2}{x-4}$

B. $\dfrac{x+1}{x-2}$

C. $\dfrac{3x+1}{x-2}$

D. $\dfrac{x+2}{x-1}$

E. $\dfrac{x-1}{x+2}$

14. Perform the indicated operations and simplify the expression.

$$\frac{1 - \dfrac{1}{x}}{1 + \dfrac{5}{x}} - 1$$

A. $\dfrac{x+1}{x-5}$

B. $\dfrac{-6}{x+1}$

C. $\dfrac{-6}{x+5}$

D. $\dfrac{6x-1}{x+5}$

E. $\dfrac{-6}{x-5}$

15. Simplify the expression.

$$\frac{(5x - 1)(5) - (5x + 1)(5)}{(5x - 1)^2}$$

A. $-\dfrac{15}{(4x - 1)^2}$

B. $-\dfrac{10}{(5x - 1)^2}$

C. $-\dfrac{11}{(4x - 1)^2}$

D. $-\dfrac{15}{(5x - 1)}$

E. $\dfrac{8}{(5x - 1)^2}$

16. Solve the equation by using the quadratic formula.

$$2x^2 + 4x - 3 = 0$$

A. $-3 + \dfrac{\sqrt{10}}{2}$ and $-3 - \dfrac{\sqrt{10}}{2}$

B. $-1 + \dfrac{\sqrt{10}}{3}$ and $-1 - \dfrac{\sqrt{10}}{3}$

C. $-1 + \dfrac{\sqrt{10}}{6}$ and $-1 - \dfrac{\sqrt{10}}{6}$

D. $-6 + \dfrac{\sqrt{10}}{2}$ and $-6 - \dfrac{\sqrt{10}}{2}$

E. $-1 + \dfrac{\sqrt{10}}{2}$ and $-1 - \dfrac{\sqrt{10}}{2}$

17. Find the real roots of the equation by factoring.

$$x^2 + 3x - 10 = 0$$

A. 1 and -4
B. 2 and -4
C. 1 and -5
D. 2 and -5
E. 5 and -7

18. Find the real roots of the equation by factoring.

$$x^2 - 9x + 20 = 0$$

A. 3 and -5
B. 7 and -7
C. -3 and -4
D. 4 and -4
E. 4 and 5

19. Perform the indicated operations and simplify the expression.

$$\left(x^2 + 3\right)^2 \left[4\left(x^2 + 3\right)^2 - 7\right](3x)$$

A.
$$3x\left(x^2 + 3\right)^2\left(4x^4 + 29x^2 + 28\right)$$

B.
$$3x\left(x^2 + 3\right)^2\left[4\left(x^2 + 3\right)^2 - 7\right]$$

C.
$$3x\left(x^2 + 3\right)^2\left(4x^4 + 29x^2 + 29\right)$$

D.
$$3x\left(x^2 + 3\right)^2\left(4x^4 + 24x^2 + 28\right)$$

E.
$$3x\left(x^2 + 3\right)^2\left(4x^4 + 24x^2 + 29\right)$$

20. Perform the indicated operations and simplify the expression.

$$\left(x^2 + 2y^2\right)x - xy\left(6y\right)$$

A. $3x^3 - 4xy^2$

B. $3x^3 - 7xy^2$

C. $x^3 - 7xy^2$

D. $x^3 - 4xy^2$

E. $2x^3 - 7xy^2$

21. Perform the indicated operations and simplify the expression.

$$\left(x + 5y^2\right)y - y\left(3y^2\right) + xy$$

A. $2xy + 2y^3$

B. $2xy - y^3$

C. $xy + 2y^3$

D. $2xy - 3y^3$

E. $2xy - y^3$

22. Factor the expression.

$12ac + 4bc - 9ad - 3bd$

A. $(3a + 3b)(2c - 3d)$

B. $(3a - 3b)(2c + 3d)$

C. $(5a + b)(2c - 4d)$

D. $(3a - b)(4c + 3d)$

E. $(3a + b)(4c - 3d)$

23. Factor the expression.

$$x^6 + 64$$

A. $\left(x^2 - 8\right)\left(x^4 + 4x^2 + 20\right)$

B. $\left(x^2 - 4\right)\left(x^4 + 4x^2 - 16\right)$

C. $\left(x^2 + 5\right)\left(x^4 - 4x^2 + 24\right)$

D. $\left(x^2 + 4\right)\left(x^4 - 4x^2 + 16\right)$

E. $\left(x^2 - 4\right)\left(x^4 - 4x^2 + 16\right)$

24. Expand the expression.

$$(x + 1)^3$$

A. $x^3 + 3x^2 + 3x - 1$

B. $x^3 + 3x^2 + 3x + 1$

C. $x^3 - 3x^2 + 3x + 1$

D. $x^3 + 3x^2 + 3x + 1$

E. $x^3 - 3x^2 + 3x - 1$

25. Factor out the greatest common factor from the expression.

$$4x^{-\frac{7}{2}} - \frac{7}{2}x^{-\frac{5}{2}}$$

$$\frac{1}{2}x^{-\frac{7}{2}}(8x - 7)$$

A.

$$\frac{1}{2}x^{-\frac{5}{2}}(8x - 7)$$

B.

$$\frac{1}{2}x^{-\frac{7}{2}}(8 - 7x)$$

C.

$$\frac{1}{2}x^{-\frac{5}{2}}(8 - 7x)$$

D.

$$x^{-\frac{7}{2}}(8 - \frac{7}{2}x)$$

E.

26. Factor out the greatest common factor from the expression.

$$4a^4 - 20a^2b^2 + 32a^3b$$

A. $5a^2\left(a^2 + 4ab - 5b^2\right)$

B. $4a^2\left(a^2 + 11ab - 9b^2\right)$

C. $4a^2\left(a^2 + 8ab - 9b^2\right)$

D. $5a^2\left(a^2 + 10ab - 6b^2\right)$

E. $4a^2\left(a^2 + 8ab - 5b^2\right)$

27. Perform the indicated operations and simplify the expression.

$$\left(\frac{1}{3} - 8 + e\right) - \left(-\frac{1}{3} - 8 + e^{-1}\right)$$

A. $\frac{2}{3} + e - e^{-1}$

B. $\frac{1}{3} - 16 + e - e^{-1}$

C. $\frac{2}{3} + 2e$

D. $\frac{26}{3} + e - e^{-1}$

E. $\frac{2}{3} - e + e^{-1}$

28. Perform the indicated operations and simplify the expression.

$$4\left(t + 5\sqrt{t}\right)^2 - 4t^2$$

A. $23t\left(2\sqrt{t} + 9\right)$

B. $21t\left(2\sqrt{t} + 3\right)$

C. $20t\left(2\sqrt{t} + 5\right)$

D. $20t\left(2\sqrt{t} + 3\right)$

E. $21t\left(4\sqrt{t} + 5\right)$

29. Perform the indicated operations and simplify the expression.

$$x - \{2x - [-x - (8 - x)]\}$$

A. $x - 1$
B. $x + 8$
C. $x + 1$
D. $-x + 8$
E. $-x - 8$

30. Perform the indicated operations and simplify the expression.

$$\left(4y^2 - 5y + 7\right) - \left(2y^2 - 9y - 8\right)$$

A. $2y^2 + 4y + 19$
B. $4y^2 + 6y + 19$
C. $2y^2 + 6y + 17$
D. $4y^2 + 4y + 19$
E. $2y^2 + 4y + 15$

31. Perform the indicated operations and simplify the expression.

$$7x^2 \left(4x^2 + 1 \right)^4 (9x) + \left(4x^2 + 1 \right)^5 (3x)$$

32. Simplify the expression.

$$\frac{x^3 + 2x^2 - 3x}{-2x^2 - x + 3}$$

33. Perform the indicated operations and simplify the expression.

$$\frac{\dfrac{2}{x} + \dfrac{5}{y}}{1 - \dfrac{2}{xy}}$$

34. Rationalize the denominator of the expression.

$$\frac{5a}{4 - \sqrt{a}}$$

35. Rationalize the numerator of the expression.

$$\frac{\sqrt[3]{y^2}}{x}$$

36. Perform the indicated operations and simplify the expression.

$$\left(x^2 + 5\right)^2 \left[\left(x^2 + 5\right)^2 - 1\right](5x)$$

37. Rationalize the numerator of the expression.

$$\frac{1 - \sqrt{7}}{7}$$

38. Rationalize the numerator of the expression.

$$\frac{2 + \sqrt{x + 6}}{\sqrt{x + 6}}$$

39. Rationalize the denominator of the expression.

$$\frac{1}{\sqrt{3x} - \sqrt{y}}$$

40. Perform the indicated operations and simplify the expression.

$$\frac{2x(x+1)^{-\frac{1}{2}} - (x+1)^{\frac{1}{2}}}{x^2}$$

41. Perform the indicated operations and simplify the expression.

$$\frac{4x^2 + 35x - 9}{2x + 20} \div \frac{x^2 - 81}{x^2 + x - 90}$$

42. Perform the indicated operations and simplify the expression.

$$\frac{1 + \dfrac{1}{x}}{1 - \dfrac{6}{x}}$$

43. Simplify the expression.

$$\frac{(3x - 1)(3) - (3x + 1)(3)}{(3x - 1)^2}$$

44. Solve the equation by using the quadratic formula.

$$x^2 + 2x - 2 = 0$$

45. Perform the indicated operations and simplify the expression.

$$\left(x^2 + 3y^2\right)x - xy\left(8y\right)$$

46. Factor the expression.

$$15ac + 3bc - 25ad - 5bd$$

47. Factor the expression.

$$x^6 + 27$$

48. Factor out the greatest common factor from the expression.

$$3x^{-\frac{9}{2}} - \frac{7}{2}x^{-\frac{7}{2}}$$

49. Factor out the greatest common factor from the expression.

$$2a^4 - 12a^2b^2 + 6a^3b$$

50. Perform the indicated operations and simplify the expression.

$$5\left(t + 3\sqrt{t}\right)^2 - 5t^2$$

51. Perform the indicated operations and simplify the expression.

$$\left(\frac{1}{7} - 4 + e\right) - \left(-\frac{1}{7} - 4 + e^{-1}\right)$$

52. Perform the indicated operations and simplify the expression.

$8x - \{9x - [-x - (4 - x)]\}$

53. Perform the indicated operations and simplify the expression.

$\left(8y^2 - 5y + 5\right) - \left(5y^2 - 7y - 6\right)$

54. Find the real roots of the equation by factoring.

$\frac{1}{2}x^2 + x - 12 = 0$

55. Find the real roots of the equation by factoring.

$x^2 + x - 20 = 0$

Tan.ApplCalcBrf9-ch01sec02 Key

1. Rationalize the numerator of the expression.

$$\frac{\sqrt[7]{y^5}}{x}$$

A. $\dfrac{y}{x + \sqrt[7]{y^2}}$

B. $\dfrac{y}{x\sqrt[7]{y^2}}$

C. $\dfrac{y}{x\sqrt[7]{y^5}}$

D. $\dfrac{yx}{\sqrt[7]{y^2}}$

E. $\dfrac{y^2}{x\sqrt[7]{y^2}}$

2. Rationalize the denominator of the expression.

$$\dfrac{a}{3 - \sqrt{a}}$$

A. $\dfrac{a(3 - \sqrt{a})}{9 - a}$

B. $\dfrac{a(3 - \sqrt{a})}{9 + a}$

C. $\dfrac{a(3 + \sqrt{a})}{9 + a}$

D. $\dfrac{(3 + \sqrt{a})}{9 - a}$

E. $\dfrac{a(3 + \sqrt{a})}{9 - a}$

3. Rationalize the denominator of the expression.

$$\frac{\left(7 + \sqrt{a}\right)}{\left(7 - \sqrt{a}\right)}$$

$$\frac{\left(7 - \sqrt{a}\right)^2}{\left(49 - a\right)}$$

A.

$$\frac{\left(7 + \sqrt{a}\right)^2}{\left(49 - a\right)}$$

B.

$$\frac{\left(7 + \sqrt{a}\right)^2}{\left(49 + a\right)}$$

C.

$$\frac{\left(7 - \sqrt{a}\right)}{\left(49 + a\right)}$$

D.

$$\frac{\left(7 - \sqrt{a}\right)^2}{\left(49 + a\right)}$$

E.

4. Perform the indicated operations and simplify the expression.

$$\dfrac{\dfrac{2}{x} + \dfrac{3}{y}}{1 - \dfrac{4}{xy}}$$

A.
$$\dfrac{3y - 2x}{xy + 4}$$

B.
$$\dfrac{3x + 2y}{xy}$$

C.
$$\dfrac{3x + 2y}{xy - 4}$$

D.
$$\dfrac{3y + 2x}{xy - 4}$$

E.
$$\dfrac{3x - 2y}{xy - 4}$$

5. Simplify the expression.

$$\frac{x^3 - x^2 - 2x}{-2x^2 + 3x + 2}$$

A. $-\dfrac{x(x+1)}{2x+1}$

B. $\dfrac{x(x+1)}{2x+1}$

C. $-\dfrac{x^2+1}{2x+1}$

D. $-\dfrac{x^2-1}{2x+1}$

E. $-\dfrac{x(x-1)}{2x+1}$

6. Find the real roots of the equation by factoring.

$$\frac{1}{4}x^2 + x - 8 = 0$$

A. $x = 8, -4$
B. $x = 4$
C. $x = 4, -8$
D. $x = -8$
E. $x = 4, 8$

7. Perform the indicated operations and simplify the expression.

$$7x^2(4x^2 + 1)^4(9x) + (4x^2 + 1)^5(3x)$$

A. $9x(25x^2 + 1)(4x^2 + 1)^4$

B. $3x(25x^2 + 1)(4x^2 + 1)^4$

C. $3x(25x^2 + 1)^2(4x^2 + 1)^3$

D. $3x(4x^2 + 1)(25x^2 + 1)^4$

E. $3x(25x^2 + 2)(4x^2 + 1)^4$

8. Rationalize the numerator of the expression.

$$\frac{2 - \sqrt{7}}{7}$$

A. $-\dfrac{5}{14\left(2 + \sqrt{7}\right)}$

B. $\dfrac{3}{7\left(2 + \sqrt{7}\right)}$

C. $\dfrac{2}{7\left(2 + \sqrt{7}\right)}$

D. $-\dfrac{2}{7\left(2 + \sqrt{7}\right)}$

E. $-\dfrac{3}{7\left(2 + \sqrt{7}\right)}$

9. Rationalize the numerator of the expression.

$$\frac{6 + \sqrt{x + 5}}{\sqrt{x + 5}}$$

A. $\dfrac{x + 31}{\sqrt{x + 5}\left(6 - \sqrt{x + 5}\right)}$

B. $-\dfrac{x - 93}{\sqrt{x + 5}\left(12 + \sqrt{x + 5}\right)}$

C. $-\dfrac{x - 31}{\sqrt{x + 5}\left(6 - \sqrt{x + 5}\right)}$

D. $-\dfrac{x - 62}{\left(6 - \sqrt{x + 5}\right)}$

E. $\dfrac{x + 36}{(x + 5)\left(6 - \sqrt{x + 5}\right)}$

10. Rationalize the denominator of the expression.

$$\frac{1}{\sqrt{5x} - 6\sqrt{y}}$$

A. $\dfrac{\sqrt{5x} + 6\sqrt{y}}{5y - 36x}$

B. $\dfrac{\sqrt{5x} + 6\sqrt{y}}{5x - 36y}$

C. $\dfrac{\sqrt{5x} + \sqrt{6y}}{5y + 36x}$

D. $\dfrac{\sqrt{5x} - 6\sqrt{y}}{5x + 6y}$

E. $\dfrac{\sqrt{5x} - 36\sqrt{y}}{5x - 36y}$

11. Perform the indicated operations and simplify the expression.

$$\frac{2x(x+7)^{-\frac{1}{2}} - (x+7)^{\frac{1}{2}}}{x^2}$$

A. $\dfrac{x-7}{x^2(x+14)}$

B. $\dfrac{x+7}{x^2\sqrt{x+9}}$

C. $\dfrac{x-7}{x^2\sqrt{x+7}}$

D. $\dfrac{x+7}{x^2\sqrt{x+7}}$

E. $\dfrac{-7x}{x\sqrt{x+7}}$

12. Perform the indicated operations and simplify the expression.

$$\frac{10x^2 + 39x - 4}{2x + 14} \div \frac{x^2 - 16}{x^2 + 3x - 28}$$

A. $\dfrac{8x-1}{4}$

B. $\dfrac{8x-5}{3}$

C. $\dfrac{11x-8}{4}$

D. $\dfrac{10x-1}{2}$

E. $\dfrac{9x-5}{2}$

13. Perform the indicated operations and simplify the expression.

$$\dfrac{1 + \dfrac{1}{x}}{1 - \dfrac{2}{x}}$$

A.
$\dfrac{x + 2}{x - 4}$

B.
$\dfrac{x + 1}{x - 2}$

C.
$\dfrac{3x + 1}{x - 2}$

D.
$\dfrac{x + 2}{x - 1}$

E.
$\dfrac{x - 1}{x + 2}$

14. Perform the indicated operations and simplify the expression.

$$\frac{1 - \dfrac{1}{x}}{1 + \dfrac{5}{x}} - 1$$

A. $\dfrac{x+1}{x-5}$

B. $\dfrac{-6}{x+1}$

C. $\dfrac{-6}{x+5}$

D. $\dfrac{6x-1}{x+5}$

E. $\dfrac{-6}{x-5}$

15. Simplify the expression.

$$\frac{(5x - 1)(5) - (5x + 1)(5)}{(5x - 1)^2}$$

A. $-\dfrac{15}{(4x - 1)^2}$

B. $-\dfrac{10}{(5x - 1)^2}$

C. $-\dfrac{11}{(4x - 1)^2}$

D. $-\dfrac{15}{(5x - 1)}$

E. $\dfrac{8}{(5x - 1)^2}$

16. Solve the equation by using the quadratic formula.

$$2x^2 + 4x - 3 = 0$$

A. $-3 + \dfrac{\sqrt{10}}{2}$ and $-3 - \dfrac{\sqrt{10}}{2}$

B. $-1 + \dfrac{\sqrt{10}}{3}$ and $-1 - \dfrac{\sqrt{10}}{3}$

C. $-1 + \dfrac{\sqrt{10}}{6}$ and $-1 - \dfrac{\sqrt{10}}{6}$

D. $-6 + \dfrac{\sqrt{10}}{2}$ and $-6 - \dfrac{\sqrt{10}}{2}$

E. $-1 + \dfrac{\sqrt{10}}{2}$ and $-1 - \dfrac{\sqrt{10}}{2}$

17. Find the real roots of the equation by factoring.

$$x^2 + 3x - 10 = 0$$

A. 1 and -4
B. 2 and -4
C. 1 and -5
D. 2 and -5
E. 5 and -7

18. Find the real roots of the equation by factoring.

$$x^2 - 9x + 20 = 0$$

A. 3 and -5
B. 7 and -7
C. -3 and -4
D. 4 and -4
E. 4 and 5

19. Perform the indicated operations and simplify the expression.

$$\left(x^2 + 3\right)^2 \left[4\left(x^2 + 3\right)^2 - 7\right](3x)$$

A.
$$3x\left(x^2 + 3\right)^2 \left(4x^4 + 29x^2 + 28\right)$$

B.
$$3x\left(x^2 + 3\right)^2 \left[4\left(x^2 + 3\right)^2 - 7\right]$$

C.
$$3x\left(x^2 + 3\right)^2 \left(4x^4 + 29x^2 + 29\right)$$

D.
$$3x\left(x^2 + 3\right)^2 \left(4x^4 + 24x^2 + 28\right)$$

E.
$$3x\left(x^2 + 3\right)^2 \left(4x^4 + 24x^2 + 29\right)$$

20. Perform the indicated operations and simplify the expression.

$$\left(x^2 + 2y^2\right)x - xy(6y)$$

A. $3x^3 - 4xy^2$

B. $3x^3 - 7xy^2$

C. $x^3 - 7xy^2$

D. $x^3 - 4xy^2$

E. $2x^3 - 7xy^2$

21. Perform the indicated operations and simplify the expression.

$$\left(x + 5y^2\right)y - y\left(3y^2\right) + xy$$

A. $2xy + 2y^3$

B. $2xy - y^3$

C. $xy + 2y^3$

D. $2xy - 3y^3$

E. $2xy - y^3$

22. Factor the expression.

$$12ac + 4bc - 9ad - 3bd$$

A. $(3a + 3b)(2c - 3d)$

B. $(3a - 3b)(2c + 3d)$

C. $(5a + b)(2c - 4d)$

D. $(3a - b)(4c + 3d)$

E. $(3a + b)(4c - 3d)$

23. Factor the expression.

$x^6 + 64$

A. $\left(x^2 - 8\right)\left(x^4 + 4x^2 + 20\right)$

B. $\left(x^2 - 4\right)\left(x^4 + 4x^2 - 16\right)$

C. $\left(x^2 + 5\right)\left(x^4 - 4x^2 + 24\right)$

D. $\left(x^2 + 4\right)\left(x^4 - 4x^2 + 16\right)$

E. $\left(x^2 - 4\right)\left(x^4 - 4x^2 + 16\right)$

24. Expand the expression.

$\left(x + 1\right)^3$

A. $x^3 + 3x^2 + 3x - 1$

B. $x^3 + 3x^2 + 3x + 1$

C. $x^3 - 3x^2 + 3x + 1$

D. $x^3 + 3x^2 + 3x + 1$

E. $x^3 - 3x^2 + 3x - 1$

25. Factor out the greatest common factor from the expression.

$$4x^{-\frac{7}{2}} - \frac{7}{2}x^{-\frac{5}{2}}$$

A. $\frac{1}{2}x^{-\frac{7}{2}}(8x - 7)$

B. $\frac{1}{2}x^{-\frac{5}{2}}(8x - 7)$

C. $\frac{1}{2}x^{-\frac{7}{2}}(8 - 7x)$

D. $\frac{1}{2}x^{-\frac{5}{2}}(8 - 7x)$

E. $x^{-\frac{7}{2}}(8 - \frac{7}{2}x)$

26. Factor out the greatest common factor from the expression.

$$4a^4 - 20a^2b^2 + 32a^3b$$

A. $5a^2\left(a^2 + 4ab - 5b^2\right)$

B. $4a^2\left(a^2 + 11ab - 9b^2\right)$

C. $4a^2\left(a^2 + 8ab - 9b^2\right)$

D. $5a^2\left(a^2 + 10ab - 6b^2\right)$

E. $4a^2\left(a^2 + 8ab - 5b^2\right)$

27. Perform the indicated operations and simplify the expression.

$$\left(\frac{1}{3} - 8 + e\right) - \left(-\frac{1}{3} - 8 + e^{-1}\right)$$

A. $\frac{2}{3} + e - e^{-1}$

B. $\frac{1}{3} - 16 + e - e^{-1}$

C. $\frac{2}{3} + 2e$

D. $\frac{26}{3} + e - e^{-1}$

E. $\frac{2}{3} - e + e^{-1}$

28. Perform the indicated operations and simplify the expression.

$$4\left(t + 5\sqrt{t}\right)^2 - 4t^2$$

A. $23t\left(2\sqrt{t} + 9\right)$

B. $21t\left(2\sqrt{t} + 3\right)$

C. $20t\left(2\sqrt{t} + 5\right)$

D. $20t\left(2\sqrt{t} + 3\right)$

E. $21t\left(4\sqrt{t} + 5\right)$

29. Perform the indicated operations and simplify the expression.

$$x - \{2x - [-x - (8 - x)]\}$$

A. $x - 1$
B. $x + 8$
C. $x + 1$
D. $-x + 8$
E. $-x - 8$

30. Perform the indicated operations and simplify the expression.

$$\left(4y^2 - 5y + 7\right) - \left(2y^2 - 9y - 8\right)$$

A. $2y^2 + 4y + 19$
B. $4y^2 + 6y + 19$
C. $2y^2 + 6y + 17$
D. $4y^2 + 4y + 19$
E. $2y^2 + 4y + 15$

31. Perform the indicated operations and simplify the expression.

$$7x^2\left(4x^2 + 1\right)^4(9x) + \left(4x^2 + 1\right)^5(3x)$$

$$3x\left(25x^2 + 1\right)\left(4x^2 + 1\right)^4$$

32. Simplify the expression.

$$\frac{x^3 + 2x^2 - 3x}{-2x^2 - x + 3}$$

$$-\frac{x(x+3)}{2x+3}$$

33. Perform the indicated operations and simplify the expression.

$$\frac{\dfrac{2}{x} + \dfrac{5}{y}}{1 - \dfrac{2}{xy}}$$

$$\frac{5x + 2y}{xy - 2}$$

34. Rationalize the denominator of the expression.

$$\frac{5a}{4 - \sqrt{a}}$$

$$\frac{5a\left(4 + \sqrt{a}\right)}{16 - a}$$

35. Rationalize the numerator of the expression.

$$\frac{\sqrt[3]{y^2}}{x}$$

$$\frac{y}{xy^{\frac{1}{3}}}$$

36. Perform the indicated operations and simplify the expression.

$$\left(x^2 + 5\right)^2\left[\left(x^2 + 5\right)^2 - 1\right](5x)$$

$$5x\left(x^2 + 5\right)^2\left(x^4 + 10x^2 + 24\right)$$

37. Rationalize the numerator of the expression.

$$\frac{1 - \sqrt{7}}{7}$$

$$-\frac{6}{7\left(1 + \sqrt{7}\right)}$$

38. Rationalize the numerator of the expression.

$$\frac{2 + \sqrt{x + 6}}{\sqrt{x + 6}}$$

$$-\frac{x + 2}{\sqrt{x + 6}\left(2 - \sqrt{x + 6}\right)}$$

39. Rationalize the denominator of the expression.

$$\frac{1}{\sqrt{3x} - \sqrt{y}}$$

$$\frac{\sqrt{3x} + 1\sqrt{y}}{3x - 1y}$$

40. Perform the indicated operations and simplify the expression.

$$\frac{2x(x+1)^{-\frac{1}{2}} - (x+1)^{\frac{1}{2}}}{x^2}$$

$$\frac{x-1}{x^2\sqrt{x+1}}$$

41. Perform the indicated operations and simplify the expression.

$$\frac{4x^2 + 35x - 9}{2x + 20} \div \frac{x^2 - 81}{x^2 + x - 90}$$

$$\frac{4x-1}{2}$$

42. Perform the indicated operations and simplify the expression.

$$\frac{1 + \dfrac{1}{x}}{1 - \dfrac{6}{x}}$$

$$\frac{x+1}{x-6}$$

43. Simplify the expression.

$$\frac{(3x-1)(3)-(3x+1)(3)}{(3x-1)^2}$$

$$-\frac{6}{(3x-1)^2}$$

44. Solve the equation by using the quadratic formula.

$$x^2 + 2x - 2 = 0$$

$$-1 + \frac{\sqrt{3}}{1}, -1 - \frac{\sqrt{3}}{1}$$

45. Perform the indicated operations and simplify the expression.

$$\left(x^2 + 3y^2\right)x - xy\left(8y\right)$$

$$1x^3 - 5xy^2$$

46. Factor the expression.

$$15ac + 3bc - 25ad - 5bd$$

$$(5a+b)(3c-5d)$$

47. Factor the expression.

$$x^6 + 27$$

$$\left(x^2 + 3\right)\left(x^4 - 3x^2 + 9\right)$$

48. Factor out the greatest common factor from the expression.

$$3x^{-\frac{9}{2}} - \frac{7}{2}x^{-\frac{7}{2}}$$

$$\frac{1}{2}x^{-\frac{9}{2}}(6-7x)$$

49. Factor out the greatest common factor from the expression.

$$2a^4 - 12a^2b^2 + 6a^3b$$

$$2a^2\left(a^2 + 3ab - 6b^2\right)$$

50. Perform the indicated operations and simplify the expression.

$$5\left(t + 3\sqrt{t}\right)^2 - 5t^2$$

$$15t\left(2\sqrt{t} + 3\right)$$

51. Perform the indicated operations and simplify the expression.

$$\left(\frac{1}{7} - 4 + e\right) - \left(-\frac{1}{7} - 4 + e^{-1}\right)$$

$$\frac{2}{7} + e - e^{-1}$$

52. Perform the indicated operations and simplify the expression.

$8x - \{9x - [-x - (4 - x)]\}$

$-x - 4$

53. Perform the indicated operations and simplify the expression.

$\left(8y^2 - 5y + 5\right) - \left(5y^2 - 7y - 6\right)$

$3y^2 + 2y + 11$

54. Find the real roots of the equation by factoring.

$\dfrac{1}{2}x^2 + x - 12 = 0$

$4, -6$

55. Find the real roots of the equation by factoring.

$x^2 + x - 20 = 0$

$4, -5$