Answers

1) 1 2) 4 3) 2 4) 4 5) 3 6) 4 7) 1 8) 1 9) 3 10) 2 11) 1 12) $(x+6)(2x+3)$
13) $(x+5)(x+8)$ 14) $(3x+2)(2x-7)$ 15) $(5x-2)(2x-3)$ 16) $(x+2)(x-2)(x^2+10)$
17) $(2x^3+1)(5x^3+4)$ 18) $(x+1)(x-1)(x+3)(x-3)$ 19) $(x+5)(x+1)(x+2)$
20) $(2x-3)(4x^2+5x-7)$ 21) $(2x+5)^3$ 22) $(x+2)^2(x-2)(x+6)$ 23) $(4x-3)(x+2)(4x+1)(x+1)$

24) 1 25) 2 26) 3 27) 2 28) 4 29) 4 30) 3 31) 4 32) 3 33) 3 34) 2 35) 1 36) 3 37) 1
38) 2 39) 4 40) 3 41) 1 42) 3 43) 4 44) 2 45) 3
46) a) $\{-2,2,5\}$ b) This graph could not represent $f(x)$. In this graph the ends point in the same direction. The given $f(x)$ is a cubic polynomial, so the ends must point in different directions.

47) $f(x)=-\frac{1}{4}(x+4)^2(x-6)$

$$y=a(x+4)^2(x-6)$$
$$36=a(2+4)^2(2-6)$$
$$36=a(6)^2(-4)$$
$$36=a(36)(-4)$$
$$-144a=36$$
$$a=-\frac{1}{4} \text{ or } a=-.25$$

48) yes

$$\begin{aligned} x^3+y^3 &= x(x^2-xy+y^2)+y(x^2-xy+y^2) \\ &= x^3-x^2y+xy^2+yx^2-xy^2+y^3 \\ &= x^3+(-x^2y+x^2y)+(xy^2-xy^2)+y^3 \\ &= x^3+y^3 \end{aligned}$$

49) Since we cannot divide by zero, we need to find all values of x that would result in the denominator being equal to zero.

$$2x^2-19x+24=0$$
$$(2x-3)(x-8)=0$$
$$x=\frac{3}{2} \text{ or } x=8$$

50) $f^{-1}(-1) = -\frac{7}{3}$

$$x=\frac{y+8}{2y-1}$$
$$-1=\frac{y+8}{2y-1}$$
$$-2y+1=y+8$$
$$-3y=7$$
$$y=-\frac{7}{3}$$

51)

$$\frac{(x+5)((3x-7)-(x+1))}{(x-4)(x+3)}=\frac{(x+5)(3x-7-x-1)}{(x-4)(x+3)}=\frac{(x+5)(2x-8)}{(x-4)(x+3)}=\frac{2(x-4)(x+5)}{(x-4)(x+3)}=\frac{2\cancel{(x-4)}(x+5)}{\cancel{(x-4)}(x+3)}=\frac{2(x+5)}{x+3}$$

52) $\frac{5x(x+6)}{10x^2} \bullet \frac{(x-6)(x+2)}{(6-x)(6+x)} = \frac{-(x+2)}{2x}$ or $\frac{-x-2}{2x}$

53)
$$= \frac{x-6}{(x+4)(x-1)} + \frac{8}{x(x+4)}$$
$$= \frac{(x-6)(x)}{(x+4)(x-1)(x)} + \frac{8(x-1)}{(x)(x+4)(x-1)}$$
$$= \frac{x^2-6x+8x-8}{x(x+4)(x-1)}$$
$$= \frac{x^2+2x-8}{x(x+4)(x-1)}$$
$$= \frac{(x+4)(x-2)}{x(x+4)(x-1)}$$
$$= \frac{\cancel{(x+4)}(x-2)}{x\cancel{(x+4)}(x-1)}$$
$$= \frac{x-2}{x(x-1)}$$

54)
$$\frac{2\cdot 5x + \frac{10}{x}\cdot 5x}{\frac{x}{5}\cdot 5x - \frac{5}{x}\cdot 5x}:$$
$$= \frac{10x+50}{x^2-25}$$
$$= \frac{10(x+5)}{(x+5)(x-5)}$$
$$= \frac{10\cancel{(x+5)}}{\cancel{(x+5)}(x-5)} = \frac{10}{x-5}$$
$$\frac{10}{x-5}$$

55)
$$\begin{array}{r|l} & 4x^2+18x+98 \\ x-5 & 4x^3-2x^2+8x+10 \\ & \underline{4x^3-20x^2} \\ & 18x^2+8x \\ & \underline{18x^2-90x} \\ & 98x+10 \\ & \underline{98x+-490} \\ & 500 \end{array}$$

$(4x^2+18x+98)+\frac{500}{x-5}$

b) $x-5$ is not a factor because the remainder is not 0 after dividing.

56) a) $x+3$ b)
$$\begin{array}{r|l} & x^2-4x-32 \\ x+3 & x^3-x^2-44x-96 \\ & \underline{x^3+3x^2} \\ & -4x^2-44x \\ & \underline{-4x^2-12x} \\ & -32x-96 \\ & \underline{-32x-96} \\ & 0 \end{array}$$

$x^2-4x-32 = (x-8)(x+4)$

The other two factors are $(x-8)$ and $(x+4)$

57) $\frac{5}{x}+\frac{x+1}{x-2}=\frac{x+4}{x(x-2)}$ → $x(x-2)\cdot\frac{5}{x}+x(x-2)\cdot\frac{x+1}{x-2}=x(x-2)\cdot\frac{x+4}{x(x-2)}$

$$5(x-2)+x(x+1)=x+4$$
$$5x-10+x^2+x=x+4$$
$$x^2+5x-14=0$$
$$(x+7)(x-2)=0$$
$$x=-7 \text{ or } x=2$$

Since $x=2$ makes two of the fractions in the equation undefined it is an extraneous root and thus must be rejected. Hence the only solution is $x=-7$.

58) 3 An extraneous root was introduced because we squared both sides of the original equation. Quadratic equations have 2 roots. Therefore it is likely when we solve radical equations this way, that we may introduce an extraneous root.

59) 2 60) 4 61) 3 62) 2 63) 2 64) 1 65) 3 66) 1 67) 2 68) 4 69) 4

70) a) 4 b) 3 because the function attains a y-value of 5 three times c) decreasing d) $\frac{5}{3}$

e) no because *f(x)* is not one-to-one, so its inverse is not a function.

71) $x \geq 9$ 72) No because it does not pass the horizontal line test. 73b) $[-7,7]$ c) -5

74) 3 75) 1 76) 2 77) 3 78) 1 79) 2 80) 3 81) 2 82) 4

83) 58, the imaginary terms have opposite signs, so they add up to zero. This leaves a number without an imaginary part, which is a real number.

84) $\pm 3i\sqrt{6}$ 85) $-5 \pm i\sqrt{3}$ 86) $-17+50i$ 87) a) $.5 \pm i$ b) The graph lies totally above the x-axis.

88) $a > 12.5$