

$$\begin{aligned}
 \textcircled{1} \quad & 5^2 - 16 \div 2^2 \cdot 4 - 1 \\
 & = 25 - 16 \div 4 \cdot 4 - 1 \\
 & = 25 - 4 \cdot 4 - 1 \\
 & = 25 - 16 - 1 \\
 & = 8
 \end{aligned}$$

$$\textcircled{2} \quad \textcircled{a} \quad A \cap B = \{a, c\}$$

$$\textcircled{b} \quad C \cup A = \{a, b, c, d, f, g\}$$

$$\begin{aligned}
 \textcircled{3} \quad & \left( \frac{1x^{-2}y^3}{2x^5y^2} \right)^{-5} = \left( \frac{2x^5y^2}{1x^{-2}y^3} \right)^5 = \left( \frac{2x^7}{y} \right)^5 \\
 & = \frac{32x^{35}}{y^5}
 \end{aligned}$$

$$\textcircled{4} \quad 2.345 \times 10^{-7}$$

$$\begin{aligned} \textcircled{5} \quad \frac{5}{6+\sqrt{2}} \cdot \frac{(6-\sqrt{2})}{(6-\sqrt{2})} &= \frac{30-5\sqrt{2}}{36-2} \\ &= \frac{30-5\sqrt{2}}{34} \end{aligned}$$

$$\begin{aligned} \textcircled{6} \quad 10x^4 - 8x^3 + 2x^2 - 5x^4 + 3x^3 - 2x^2 + 1 \\ &= 5x^4 - 5x^3 + 1 \end{aligned}$$

$$\begin{aligned} \textcircled{7} \quad (x-3)(x^2-4x+3) \\ &= x^3 - 4x^2 + 3x - 3x^2 + 12x - 9 \\ &= x^3 - 7x^2 + 15x - 9 \end{aligned}$$

$$\textcircled{8} \quad x^3 - 3x^2 \Big/ -9x + 27$$

$$x^2(x-3) - 9(x-3)$$

$$(x-3)(x^2-9)$$

$$(x-3)(x+3)(x-3)$$

$$(x-3)^2(x+3)$$

$$\textcircled{9} \frac{(\cancel{x-8})(x+3)}{(x-4)(\cancel{x+3})} \cdot \frac{(\cancel{x+3})(\cancel{x-2})}{(\cancel{x-8})(\cancel{x-2})}$$

$$= \frac{(x+3)}{(x-4)}$$

$$\textcircled{10} \frac{x}{(x-3)(x+3)} + \frac{x-1}{(x-3)(x-2)}$$

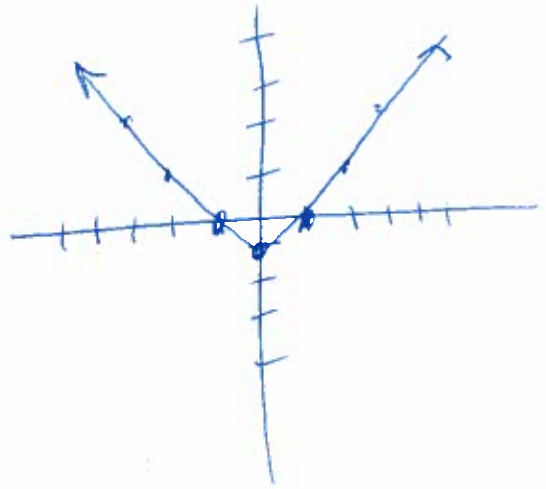
$$= \frac{x(x-2)}{(x-3)(x+3)(x-2)} + \frac{(x-1)(x+3)}{(x-3)(x+3)(x-2)}$$

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

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

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x	y
-3	$  -3   - 1 = 2$
-2	$  -2   - 1 = 1$
-1	$  -1   - 1 = 0$
0	$  0   - 1 = -1$
1	$  1   - 1 = 0$
2	$  2   - 1 = 1$
3	$  3   - 1 = 2$



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$$7x + 1 = 5(x + 5) + 2x$$

$$7x + 1 = 5x + 25 + 2x$$

$$\cancel{7x} + 1 = \cancel{7x} + 25$$

$$- \cancel{7x} \quad - \cancel{7x}$$

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$$1 = 25$$

not true, inconsistent

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$$x^2 - x - 6 = 0$$

$$(x - 3)(x + 2) = 0$$

$$x = 3 \quad x = -2$$

$$\textcircled{14} \quad \frac{4x^2}{4} = \frac{16}{4}$$

$$x^2 = 4$$

$$x = \pm 2$$

$$\textcircled{15} \quad x^2 - 10x + 1 = 0$$

$$x^2 - 10x = -1$$

$$x^2 - 10x + \left(\frac{10}{2}\right)^2 = -1 + \left(\frac{10}{2}\right)^2$$

$$x^2 - 10x + 25 = -1 + 25$$

$$(x-5)(x-5) = 24$$

$$(x-5)^2 = 24$$

$$x-5 = \pm\sqrt{24}$$

$$x = \pm\sqrt{24} + 5$$

$$x = \pm 2\sqrt{6} + 5$$

$$\begin{array}{r} 24 \\ \wedge \\ 2 \ 12 \\ \wedge \\ 2 \ 6 \\ \wedge \\ 2 \ 3 \end{array}$$

$$(16) \quad 2x^2 - 1x - 3 = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-(-1) \pm \sqrt{(-1)^2 - 4(2)(-3)}}{2(2)}$$

$$= \frac{1 \pm \sqrt{1 + 24}}{4}$$

$$= \frac{1 \pm \sqrt{25}}{4}$$

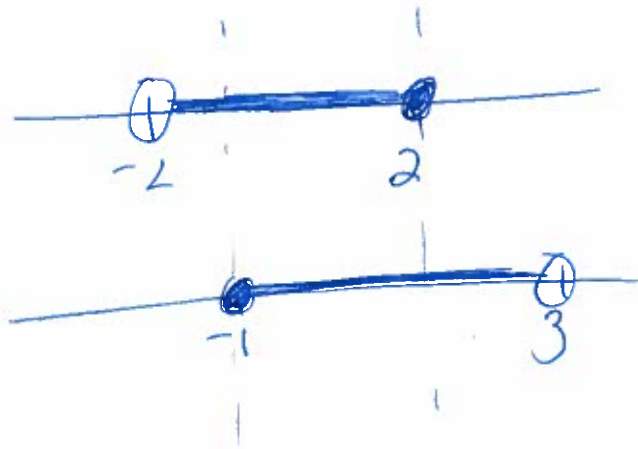
$$= \frac{1 \pm 5}{4}$$

$$\frac{1+5}{4} \quad \text{and} \quad \frac{1-5}{4}$$

$$\frac{6}{4} \quad \quad \quad \frac{-4}{4}$$

$$\frac{3}{2} \quad \text{and} \quad -1$$

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$$[-1, 2]$$

18

$$|x+1| = 9$$

$$\begin{array}{r} x+1 = 9 \\ -1 \quad -1 \\ \hline x = 8 \end{array} \quad \begin{array}{r} x+1 = -9 \\ -1 \quad -1 \\ \hline x = -10 \end{array}$$

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$$\begin{array}{r} 9 < 2x+3 \leq 12 \\ -3 \quad -3 \quad -3 \\ \hline 6 < \frac{2x}{2} \leq 9 \end{array}$$

$$3 < x \leq \frac{9}{2}$$

$$\left(3, \frac{9}{2}\right]$$

$$\textcircled{20} \quad |2x+3| \geq 15$$

$$\frac{2x+3 \geq 15}{-3 \quad -3}$$

$$\frac{2x \geq 12}{2 \quad 2}$$

$$x \geq 6$$

$$\frac{2x+3 \leq -15}{-3 \quad -3}$$

$$\frac{2x \leq -18}{2 \quad 2}$$

$$x \leq -9$$



$$(-\infty, -9] \cup [6, \infty)$$

$$\begin{aligned} \textcircled{21} \quad f(x+1) &= (x+1)^2 + 3(x+1) - 1 \\ &= (x+1)(x+1) + 3x + 3 - 1 \\ &= x^2 + (x+1)x + 1 + 3x + 3 - 1 \\ &= x^2 + 5x + 3 \end{aligned}$$



$$\begin{aligned}
 (22) \quad f(-x) &= (-x)^3 + (-x)^2 \\
 &= -x^3 + x^2 \\
 &= -(x^3 - x^2)
 \end{aligned}$$

neither

$$(23) \quad m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-4 - 5}{2 - -1} = \frac{-9}{3} = -3$$

$$(24) \quad (1, 4) \text{ perp to } \begin{array}{r} 3x + 6y = 12 \\ -3x \quad -3x \\ \hline 6y = -3x + 12 \\ \frac{6y}{6} = \frac{-3x}{6} + \frac{12}{6} \end{array}$$

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

$$m = -\frac{1}{2} \rightarrow m = 2$$

$$y = m \cdot x + b$$

$$4 = 2(1) + b$$

$$4 = 2 + b$$

$$2 = b$$

$$y = 2x + 2$$

$$\textcircled{25} \frac{f(b)-f(a)}{b-a} = \frac{(3)^2 - (-2)^2}{3 - -2}$$

$$= \frac{9-4}{5} = \frac{5}{5} = \textcircled{1}$$

$$\textcircled{26} \sqrt{x-5}$$

$$x-5 \geq 0$$

$$x \geq 5$$

$$[5, \infty)$$

$$\textcircled{27} \textcircled{a} (f-g)(x) = x^2 + 3 - (x-1)$$
$$= x^2 + 3 - x + 1$$
$$= x^2 - x + 4$$

$$\textcircled{b} (f \circ g)(x) = (x-1)^2 + 3$$
$$= x^2 - 2x + 1 + 3$$
$$= x^2 - 2x + 4$$

$$\textcircled{c} (f \circ g)(1) = 1^2 - 2 + 4$$
$$= 1 - 2 + 4$$
$$= 3$$

$$(28) \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$= \left( \frac{-3 + 5}{2}, \frac{3 + 7}{2} \right)$$

$$= \left( \frac{-8}{2}, \frac{10}{2} \right)$$

$$= (-4, 5)$$

$$(29) (1, -2) \text{ and } (-2, 1)$$

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$\sqrt{(-2 - 1)^2 + (1 - (-2))^2}$$

$$\sqrt{(-3)^2 + (3)^2}$$

$$\sqrt{9 + 9}$$

$$\sqrt{18}$$

$$= 3\sqrt{2}$$

18  
^  
24  
^  
33

30 Center:  $(12, -9)$  Radius: 5

31 (a)  $(-3, -5)$

(b) up

(c) min

(d)  $(-\infty, \infty)$

(e)  $[-5, \infty)$

32  $x^2 - 2x + 8$


$$\frac{-b}{2a} = \frac{2}{2(1)} = 1$$

$$1^2 - 2(1) + 8$$

$$1 - 2 + 8$$

$$7$$

$(1, 7)$

33 (a)  $x(x)^3(x)^2 = x^6$  

(b)  $x=0$  |  $x=9$  |  $x=-2$

(c)  $m=1$  |  $m=3$  |  $m=2$

(d) cross | cross | touch

(e)  $(0, 0)$

(34)

$$\begin{array}{r|rrrrrr} -1 & 3 & -2 & 0 & 0 & -1 \\ & \downarrow & -3 & 5 & -5 & 5 \\ \hline & 3 & -5 & 5 & -5 & \parallel 4 \end{array}$$

$$3x^3 - 5x^2 + 5x - 5 + \frac{4}{x+1}$$

(35)

$$\frac{-16}{2} = \frac{\pm 1, \pm 2, \pm 4, \pm 8, \pm 16}{\pm 1, \pm 2}$$

$$= \pm 1, \pm 2, \pm 4, \pm 8, \pm 16, \pm \frac{1}{2}$$

(36)

$$f(x) = \frac{2(x^2 + 3x + 2)}{(x-5)(x+2)} = \frac{2(x+2)(x+1)}{(x-5)(x+2)}$$

(a)  $(-\infty, -2) \cup (-2, 5) \cup (5, \infty)$

(b)  $x = 5$

(c)  $y = 2$

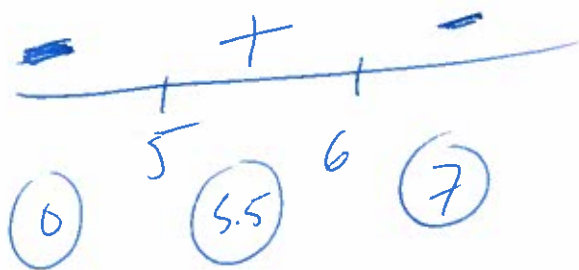
$$(37) \frac{1}{x-5} - 1 \geq 0$$

$$\frac{1}{x-5} - \frac{1(x-5)}{x-5} \geq 0$$

$$\frac{1 - 1x + 5}{x-5} \geq 0$$

$$\frac{-1x + 6}{x-5} \geq 0$$

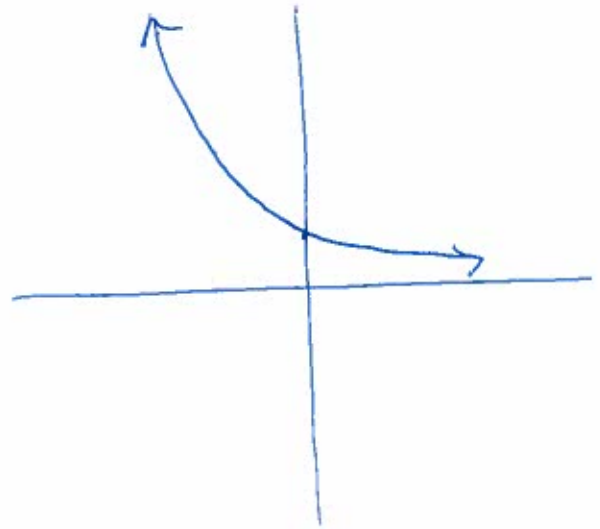
$$x=6 \quad x=5$$



$$(5, 6]$$

$$(38) f(x) = \left(\frac{1}{2}\right)^x$$

x	y
-3	$\left(\frac{1}{2}\right)^{-3} = \left(\frac{2}{1}\right)^3 = 8$
-2	$\left(\frac{1}{2}\right)^{-2} = \left(\frac{2}{1}\right)^2 = 4$
-1	$\left(\frac{1}{2}\right)^{-1} = (2)^1 = 2$
0	$\left(\frac{1}{2}\right)^0 = 1$
1	$\left(\frac{1}{2}\right)^1 = \frac{1}{2}$
2	$\left(\frac{1}{2}\right)^2 = \frac{1}{4}$
3	$\left(\frac{1}{2}\right)^3 = \frac{1}{8}$



$$(39) 4^x = 97$$

$$(40) \log_2 5 = x$$

$$(41) 16^y = 4$$

$$y = \frac{1}{2}$$

$$(42) \log_2 x + 2 \log_2 y - \log_2 64$$

$$\log_2 x + 2 \log_2 y - 6$$

$$(43) \ln \frac{x(x-2)^3}{(x+6)^5 (x-3)^{1/2}}$$

$$(44) \log_3 [(x-1)(x+2)] = 2$$

$$x^2 - 1x + 2x - 2 = 3^2$$

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

$$x^2 + x - 11 = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-1 \pm \sqrt{1^2 - 4(1)(-11)}}{2(1)}$$

$$= \frac{-1 \pm \sqrt{1 + 44}}{2}$$

$$= \frac{-1 \pm \sqrt{45}}{2}$$

$$= \frac{-1 \pm 3\sqrt{5}}{2}$$

$$\frac{-1 + 3\sqrt{5}}{2}$$

$$\begin{array}{c} 45 \\ \wedge \\ 5 \ 9 \\ \wedge \\ 3 \ 3 \end{array}$$



$$(45) \quad 3^{x+2} = 7^{4x-5}$$

$$(x+2) \ln 3 = (4x-5) \ln 7$$

$$x \ln 3 + 2 \ln 3 = 4x \ln 7 - 5 \ln 7$$

$$x \ln 3 - 4x \ln 7 = -5 \ln 7 - 2 \ln 3$$

$$x(\ln 3 - 4 \ln 7) = -5 \ln 7 - 2 \ln 3$$

$$x = \frac{-5 \ln 7 - 2 \ln 3}{\ln 3 - 4 \ln 7}$$