

# Polynomialdivision

$$1. \quad x+9 \overline{) x^4 + x^3 + 0x^2 - 27x - 27} \quad \begin{array}{l} x^3 - 8x^2 + 72x - 675 + \frac{6048}{x+9} \\ x+9 \end{array}$$

$$\begin{array}{r} -x^4 + 9x^3 \downarrow \\ \hline -8x^3 + 0x^2 \\ +8x^3 + 72x^2 \downarrow \\ \hline 72x^2 - 27x \\ -72x^2 + 648 \downarrow \\ \hline -675x - 27 \\ +675x + 6075 \\ \hline \end{array}$$

$$\boxed{x^3 - 8x^2 + 72x - 675 + \frac{6048}{x+9}}$$

$$2. \quad x-3 \overline{) -x^3 + 4x^2 + 0x + 9} \quad \begin{array}{l} -x^2 + x + 3 \\ 6048 \end{array}$$

$$\begin{array}{r} +x^3 + 3x^2 \downarrow \\ \hline x^2 + 0x \\ -x^2 + 3x \downarrow \\ \hline 3x + 9 \\ -3x + 9 \\ \hline 18 \end{array}$$

$$\boxed{-x^2 + x + 3 + \frac{18}{x-3}}$$

$$3. \quad x+1 \overline{) 3x^3 - 2x^2 + 2x - 5} \quad \begin{array}{l} 3x^2 - 5x + 7 \\ 12 \end{array}$$

$$\begin{array}{r} 3x^3 + 3x^2 \downarrow \\ \hline -5x^2 + 2x \\ +5x^2 + 5x \\ \hline 7x - 5 \\ -7x + 7 \\ \hline -12 \end{array}$$

$$\boxed{3x^2 - 5x + 7 - \frac{12}{x+1}}$$

4. ↑↑

5. ↑↓

6. ↓↓

7.  $y = x(x+1)^3(x-2)$

8.  $y = (x+2)^2(x-2)^2$

9.  $y = x^2(x-3)$

10.  $y = (x+2)^3(x-1)^2(x-4)$

11.  $y = (x+4)(x+2)(x-3)$

12.  $y = -(x+2)(x+1)^2(x-1)^2$

13.  $y = x^3(x+5)^2(x-3)^2$

# Quadratics

1.  $3x(x^2 - 2x - 15) =$

$3x(x-5)(x+3)$

2.  $(4x+1)(4x-1)$

3.  $(4x-1)(x-3)$

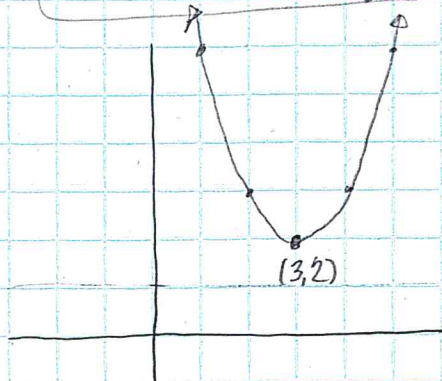
4.  $3x(x^2 - 9) =$

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

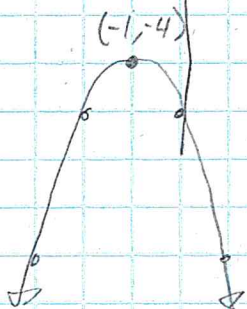
5.  $(x+9)^2$

6.  $(2x+5)(x+2)$

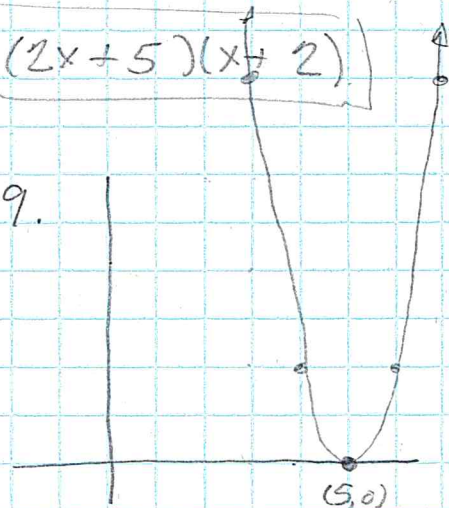
7.



8.



9.



10.  $y = (x+3)^2 - 5$

11.  $y = -2(x-1)^2 + 3$

12.  $y = \frac{1}{4}(x+2)^2 - 2$

13.  $y = x^2 - 2x - 3 - 1$   
 $(\frac{-2}{2} = -1)^2 = 1$

14.  $y = -2(x^2 - x + \frac{1}{4} - \frac{1}{4}) + 1 = -2(x^2 - x + \frac{1}{4}) + \frac{1}{2} + 1$   
 $(\frac{-1}{2})^2 = \frac{1}{4}$

$y = (x-1)^2 - 4$

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

15.  $y = x^2 + 5x + 4 - \frac{25}{4}$   
 $(\frac{5}{2})^2 = \frac{25}{4}$

16.  $(3x+1)(x+3) = 0$

$x = -\frac{1}{3}, -3$

$y = (x + \frac{5}{2})^2 - \frac{9}{4}$

17.  $-(4x^2 + 4x - 3) = 0$

$-(2x-1)(2x+3) = 0$

$x = \frac{1}{2}, -\frac{3}{2}$

18.  $5x - .01x^2 = 0$

$50x - x^2 = 0$

$x(50-x) = 0$

$x = 0, 50$

# Radicals

1.  $\boxed{xy \sqrt[4]{x^3}}$

2.  $\left(\frac{4y^2}{x^2}\right)^{3/2} = \left(\frac{2y}{x}\right)^3 = \boxed{\frac{8y^3}{x^3}}$

3.  $\boxed{2xy^3}$

4.  $\boxed{\frac{y^5}{z^2}}$

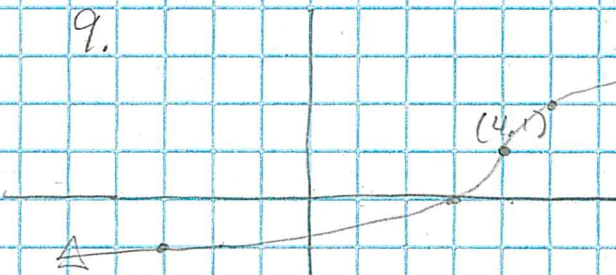
5.  $3 \cdot 4\sqrt{2} + 2 \cdot 5\sqrt{2}$   
 $12\sqrt{2} + 10\sqrt{2}$   
 $\boxed{22\sqrt{2}}$

6.  $2 \cdot 7\sqrt{2} - 5 \cdot 2\sqrt{2}$   
 $14\sqrt{2} - 10\sqrt{2}$   
 $\boxed{4\sqrt{2}}$

7.  $-6 \cdot 3\sqrt{3} + 4\sqrt{3}$   
 $-18\sqrt{3} + 4\sqrt{3}$   
 $\boxed{-14\sqrt{3}}$

8.

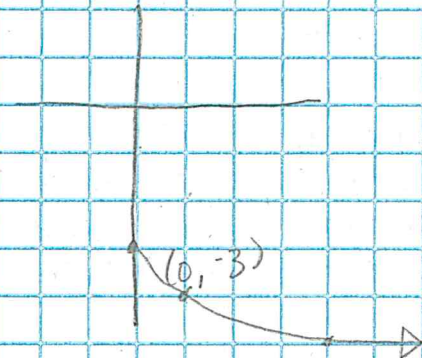
9.



$(-2, -4)$

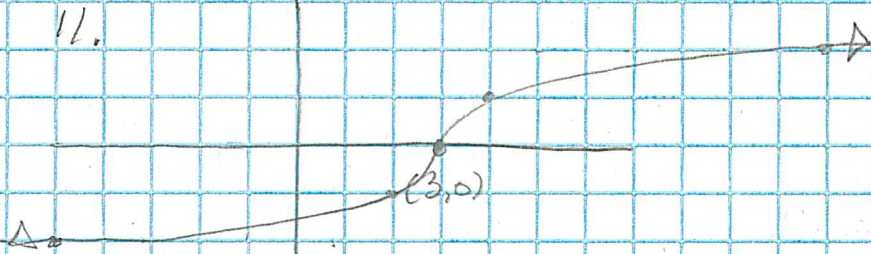
$(4, 1)$

10.



$(0, -3)$

11.



$(3, 0)$

12.  $(\sqrt{2x-8} = \sqrt{19-x})^2$   
 $2x-8 = 19-x$   
 $3x = 27$   
 $\boxed{x = 9}$

13.  $(-20 - 2n)^{5/2} = 4^{5/2}$   
 $-20 - 2n = 2^5$   
 $-2n = 32 + 20$   
 $-2n = 52$   
 $\boxed{n = -26}$

14.  $2^4 = ((x-17)^4)^4$   
 $16 = x - 17$   
 $\boxed{x = 33}$

## Inverses

$$1. x = \sqrt{\frac{y+1}{3}}$$

$$x^2 = \frac{y+1}{3}$$

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

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

$$2. x = 2y^3 + 4$$

$$\frac{x-4}{2} = \frac{2y^3}{2}$$

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

$$\sqrt[3]{\frac{x-4}{2}} = y$$

$$3. x = \sqrt[5]{y} + 6$$

$$(x-6 = \sqrt[5]{y})^5$$

$$(x-6)^5 = y$$

$$4. (f \cdot g)(x) = f(x) \cdot g(x)$$

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

$$= x^3 - 5x^2 + 6x$$

$$5. (g-f)(x) = g(x) - f(x)$$

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

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

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

$$6. f(g(x))$$

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

$$= x^2 - 2x - 3$$

$$7. f(g(x)) = \sqrt{(x+1-1)^3 + 2} = \sqrt{x^3 + 2}$$

$$8. g(f(x)) = \sqrt{(x-1)^3 + 2} + 1$$

## Exponentials

$$1. D: (-\infty, \infty) \text{ or all real \#s}$$

$$R: (-\infty, 1) \text{ or } y < 1$$

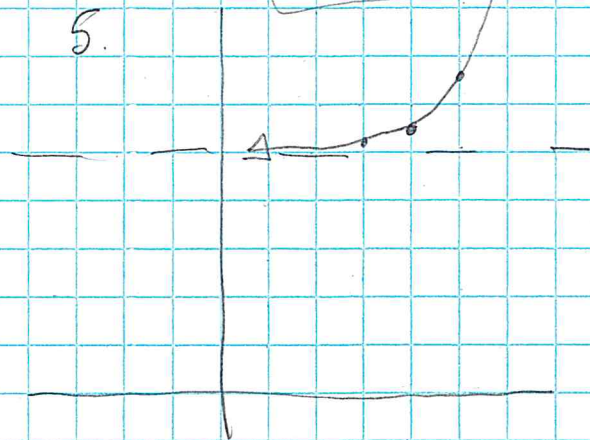
$$2. D: (-\infty, \infty)$$

$$R: (-4, \infty) \text{ or } y > -4$$

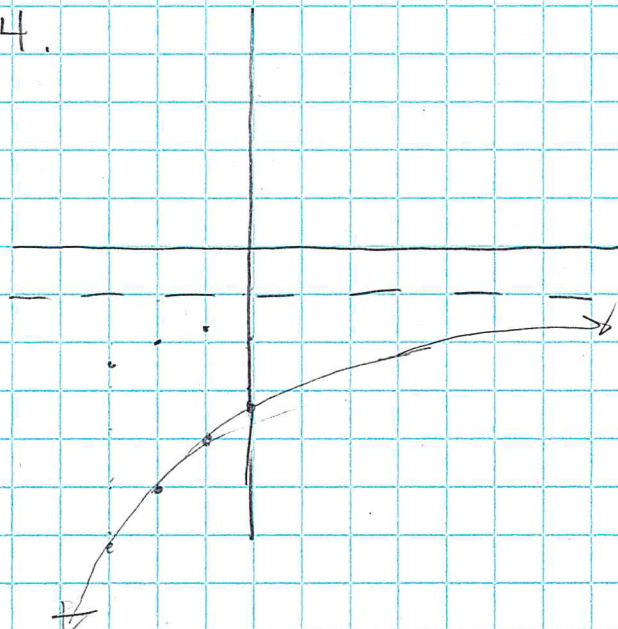
$$3. D: (-\infty, \infty)$$

$$R: (-2, \infty) \text{ or } y > -2$$

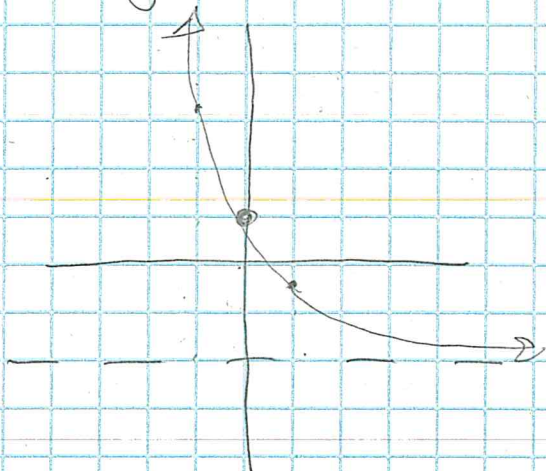
5.



4.



$$6. y = 3\left(\frac{4}{7}\right)^x - 2$$



$$8. 10^{-1(-2x)} = 10^2$$

$$2x = 2$$

$$\boxed{x = 1}$$

$$10. 6^{x+1} - 10 = -3.7$$

$$\log 6^{x+1} = \log 6.3$$

$$(x+1) \log 6 = \log 6.3$$

$$x+1 = \frac{\log 6.3}{\log 6}$$

$$x = \frac{\log 6.3}{\log 6} - 1 \approx 1.312$$

$$7. 6^{2(3-2x)} = 6^{3(2x)}$$

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

$$6 - 4x = 6x$$

$$10x = 6$$

$$\boxed{x = \frac{3}{5}}$$

$$9. 18^{x+4} = \frac{31}{2}$$

$$(x+4) \log 18 = \log \left(\frac{31}{2}\right)$$

$$x = \frac{\log \left(\frac{31}{2}\right)}{\log 18} - 4$$

$$\boxed{\approx -3.05}$$

$$11. y = 30000(1.05)^{44}$$

$$\boxed{\$256,714.51}$$

$$12. 100 = 400(.71)^x$$

$$\frac{1}{4} = .71^x$$

$$\frac{\log \frac{1}{4}}{\log .71} = x$$

$$\boxed{x \approx 4.05 \text{ hrs.}}$$

logs

$$1. \log_3 a^3 \sqrt{b} - \log_3 c^4$$

$$\boxed{\log_3 a + \frac{1}{3} \log_3 b - 4 \log_3 c}$$

$$2. \log \frac{x^2 y^4}{z} = \log x^2 y^4 - \log z$$

$$\boxed{= 2 \log x + 4 \log y - \log z}$$

$$3. \log_8 \left( \frac{x^6 y^2}{z^8} \right) = 6 \log_8 x + 2 \log_8 y - 8 \log_8 z$$

$$4. \log x^4 + \log \sqrt[3]{y} - \log z^2$$

$$\log \left( \frac{x^4 \sqrt[3]{y}}{z^2} \right)$$

$$5. \log_4 x^3 + \log_3 \sqrt{z} - \log_3 x + \log_3 4$$

can't be  $\neq \log -$

$$6. \log_{15} (4x+8) = \log_{15} (3x-2)$$

$$4x+8 = 3x-2$$

$$x = -10$$

$$\log_{15} (4(-10)+8) = \log_{15} (-32)$$

DNE  
No Solution

$$7. \log_6 x + \log_6 (x+1) = 1$$

$$x(x+1) = 6$$

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

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

$$x = -3, 2$$

$\log(-3)$  DNE so  $x=2$

$$8. \log x - \log(x+5) = 1$$

$$\log \left( \frac{x}{x+5} \right) = 1$$

$$\frac{x}{x+5} = 10$$

$$x = 10x + 50$$

$$-9x = 50$$

$$x = \frac{50}{-9}$$

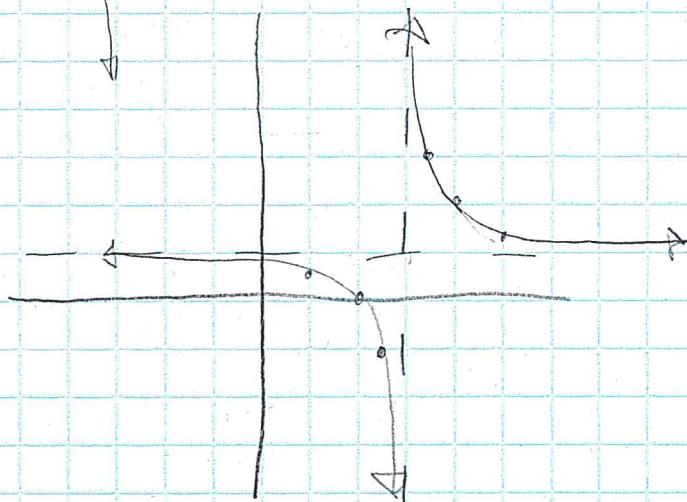
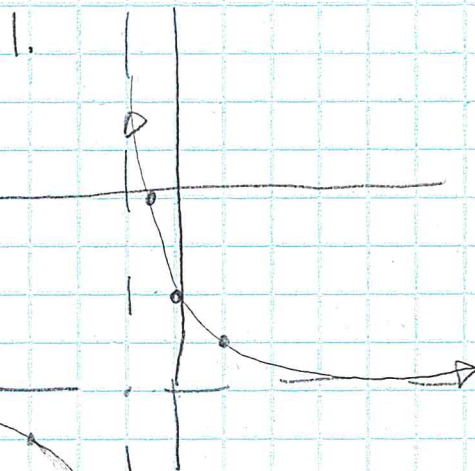
$$\log \left( \frac{50}{-9} \right) \text{ DNE}$$

No Solution.

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

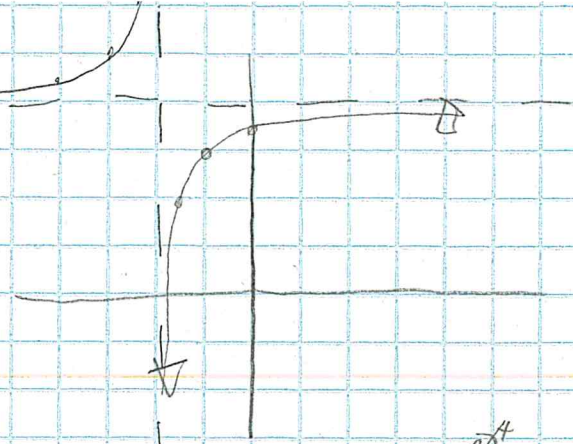
$$x-3 \overline{) x-2} \\ \underline{-(x-3)} \\ 1$$

Radical



$$3. f(x) = \frac{4x+7}{x+2} = \frac{-1}{x+2} + 4$$

$$\begin{array}{r} 4 \\ x+2 \overline{) 4x+7} \\ \underline{-4x+8} \\ -1 \end{array}$$



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

$$2x+14 = 3x-15$$

$$\boxed{29 = x}$$

$$5. 4 = 6 + \frac{2}{x+9}$$

$$-2 = \frac{2}{x+9}$$

$$\begin{aligned} -2x-18 &= 2 \\ -2x &= 20 \end{aligned}$$

$$\boxed{x = -10}$$

$$6. \frac{4}{x^2+3x} - \frac{2}{x} = \frac{7}{x+3}$$

$$\begin{aligned} 4 - 2(x+3) &= 7x \\ 4 - 2x - 6 &= 7x \end{aligned}$$

$$-2 = 9x$$

$$\boxed{x = -\frac{2}{9}}$$

$$7. \frac{2(x+2)}{(x+1)(x+2)} \cdot \frac{(x+1)}{4(x-3)} = \frac{1}{2(x-3)}$$

$$8. \frac{(2x+3)(3x-1)}{x-5} \cdot \frac{(x-5)(x+1)}{(3x-1)(x+1)}$$

$$\boxed{= 2x+3}$$

$$9. \frac{3x+1}{3x(2x-3)} - \frac{4}{x+1}$$

$$\frac{(x+1)1}{(x+1)(2x-3)} - \frac{4(2x-3)}{(x+1)(2x-3)}$$

$$\frac{x+1-4(2x-3)}{(x+1)(2x-3)}$$

$$\frac{x+1-8x+12}{(x+1)(2x-3)}$$

$$\boxed{\frac{-7x+13}{(x+1)(2x-3)}}$$

$$10. \frac{2}{(x-4)(x+4)} + \frac{x(x+4)}{(x-4)(x+4)}$$

$$\frac{2+x^2+4x}{(x-4)(x+4)}$$

$$\boxed{\frac{x^2+4x+2}{(x-4)(x+4)}}$$

