SUMMER ENRICHMENT FOR: Advanced Topics in Math, Analysis of Functions Honors, and Pre – Calculus

ALGEBRA REVIEW –

Inequalities:

Solve the inequality and graph the solution set:

1) $11y - 9 > 13$

2) $7x + 9 \geq 10x - 12$

3) $-2x + 7 < 3$ or $3x + 5 < 2$

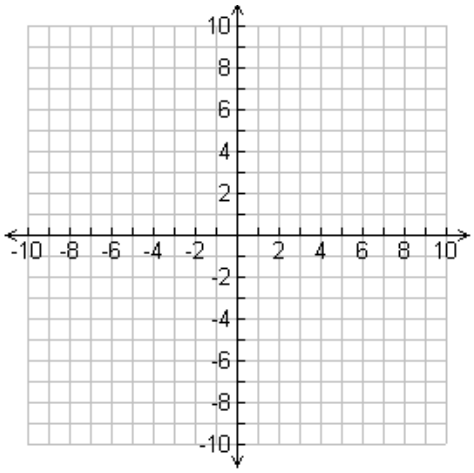
4) $-2 < -2n + 1 \leq 7$

5) $-3|x - 5| < -3$

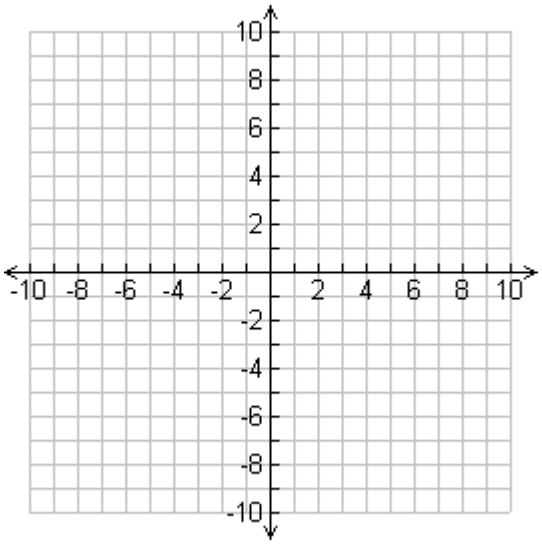
6) $|x - 1| - 3 \leq 1$

Linear Equations and Functions:

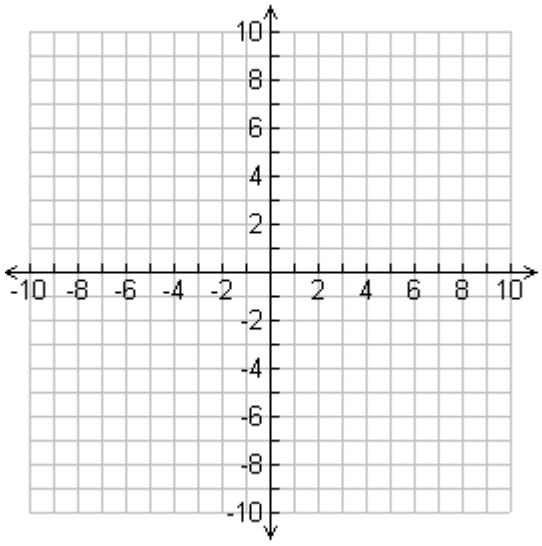
7) Find the slope of the line that passes through the points (0, -4) and (2, -6) Write the equation of the line in slope-intercept form and in standard form. Graph the line.



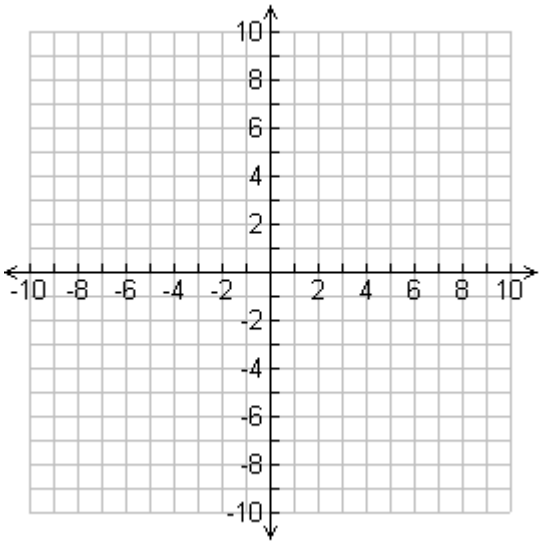
8) Graph $f(x)=\begin{cases} x-1, x<0 \\ -x+2, x\geq 0 \end{cases}$



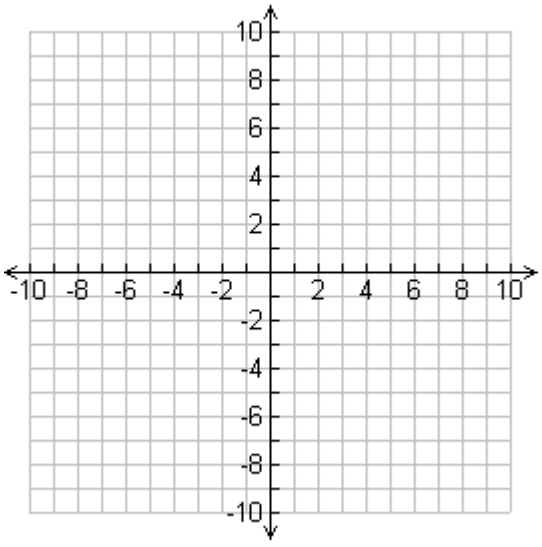
9) Graph $f(x)=\begin{cases} 2, -4<x\leq 2 \\ 5, -2<x\leq 0 \\ 7, 0<x\leq 2 \\ 10, 2<x\leq 4 \end{cases}$



10) Graph $y=-\frac{1}{3}|x-2|+2$



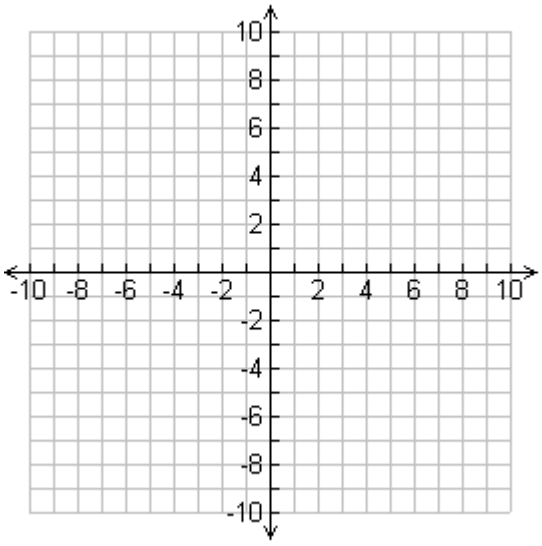
11) Graph $y=2|x+3|+1$



Systems of Linear Equations and Inequalities:

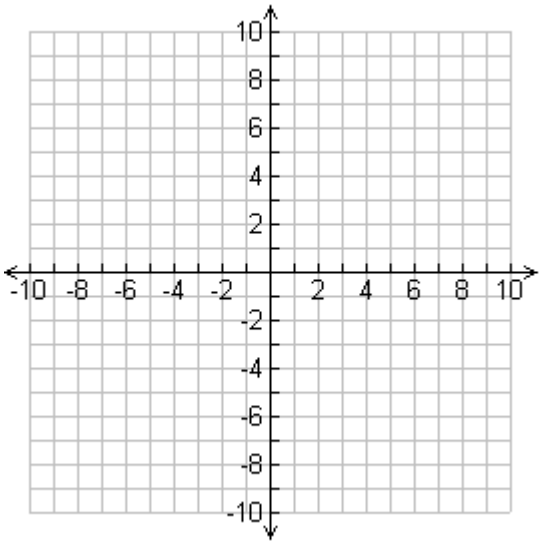
12) Solve the system graphically and algebraically:

$$\begin{cases} x + y = 1 \\ y = \frac{2}{3}x - 4 \end{cases}$$



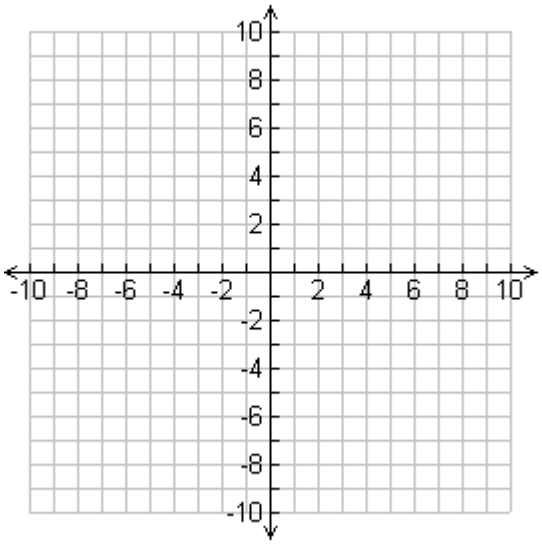
13) Graph the system:

$$\begin{cases} x - 2y \le 3 \\ y > 3x - 4 \end{cases}$$



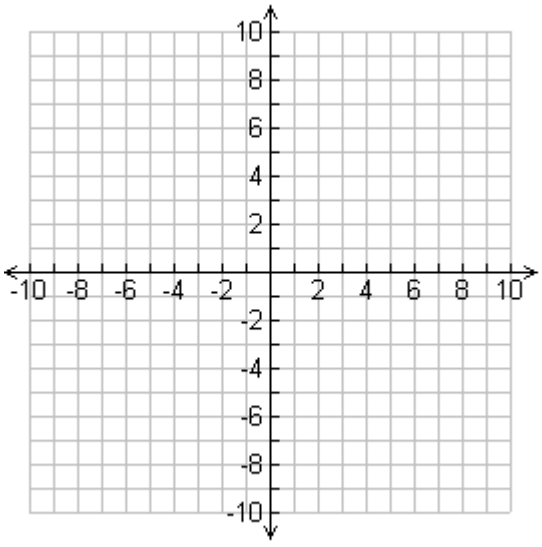
Quadratic Functions:

14) Graph: $y = 2(x - 1)^2 + 3$



Axis of symmetry: Domain:
Vertex: Range:

15) Graph: $y = -(x + 2)(x - 4)$

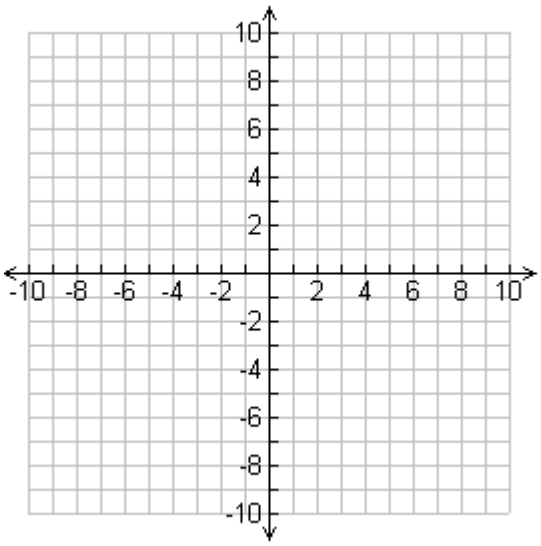


Axis of symmetry: Domain:
Vertex: Range:

16) Graph: $f(x) = x^2 + 3x - 4$

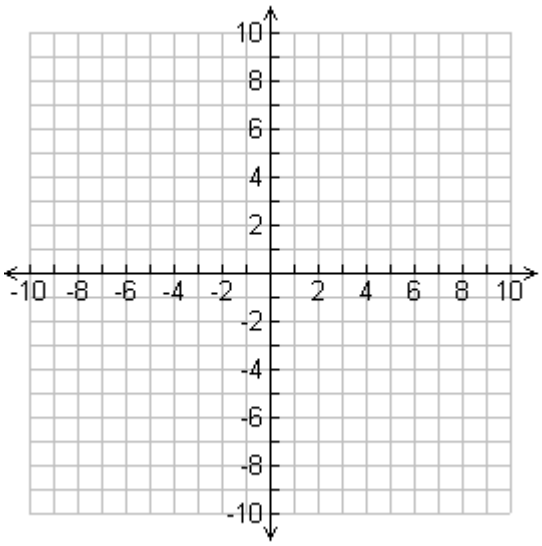
Axis of symmetry: Domain:

Vertex: Range:



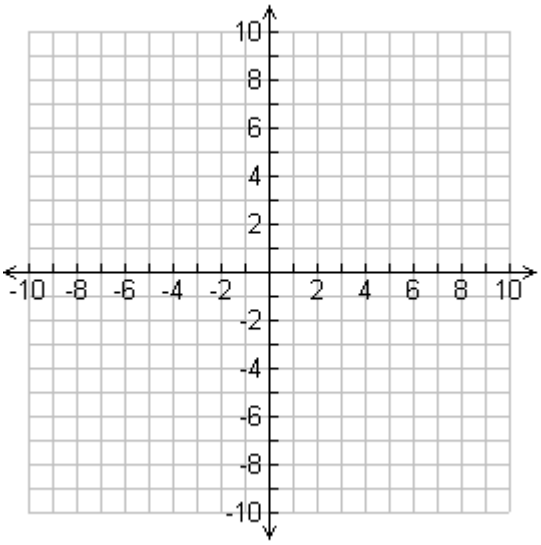
17) Graph the system of inequalities:

$$\begin{cases} y \le -x^2 + 9 \\ y \ge x^2 + 5x - 6 \end{cases}$$

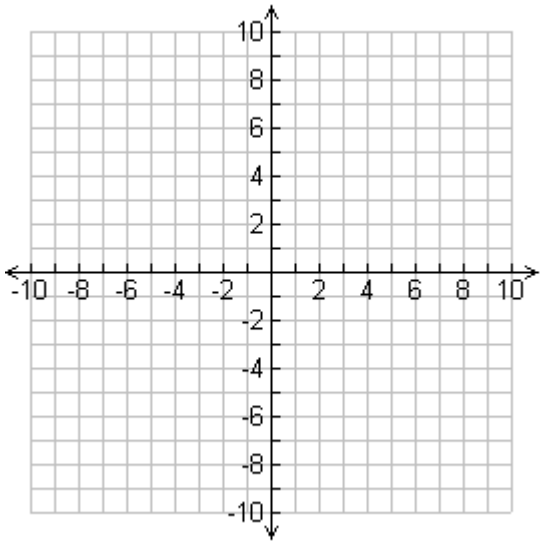


Polynomial Functions:

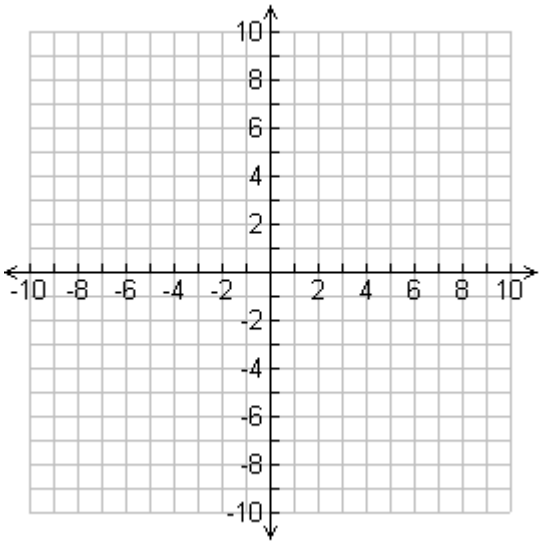
18) Graph: $f(x) = x^3 - x^2 - 9x + 9$



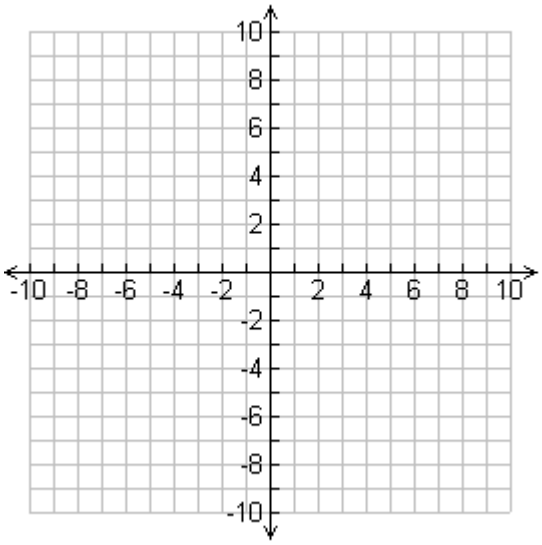
19) Graph: $f(x) = -\frac{1}{2}(x-3)(x+2)(x-1)^2$



20) Graph: $f(x) = -2x^3 + 5x^2$

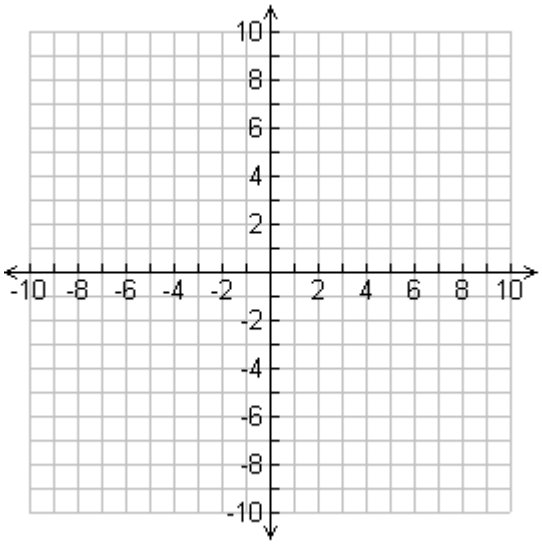


21) Graph: $f(x) = x^4 - 3x^3 + x + 2$

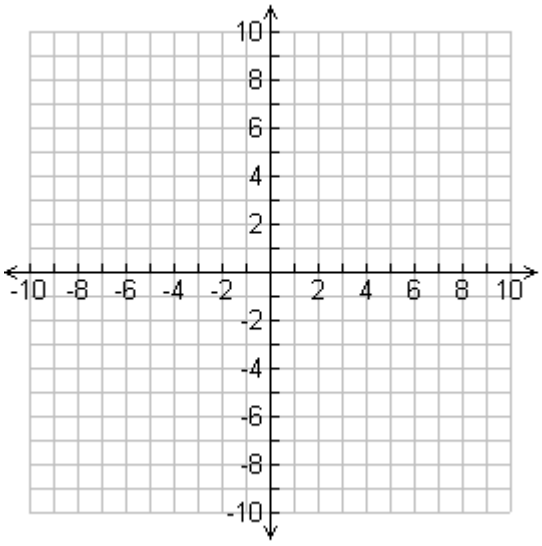


Inverses:

22) Graph $y = -3x + 6$
Find the inverse and graph it.
Is the inverse a function?



23) Graph $f(x) = 2x^2 - 4$
Find the inverse and graph it.
Is the inverse a function?

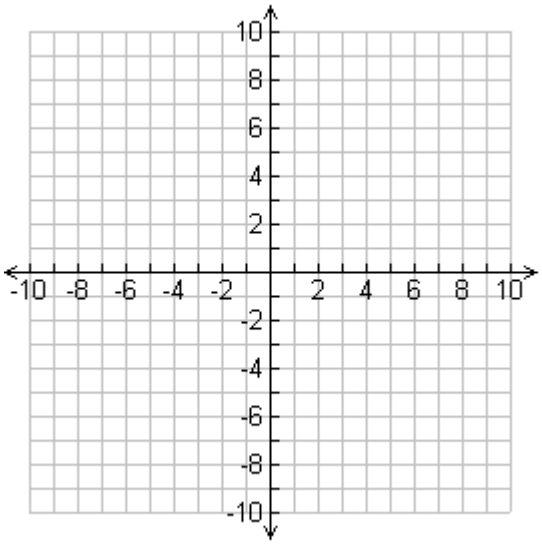


Radicals:

24) Graph: $y = 2\sqrt{x+4} - 1$

Domain:

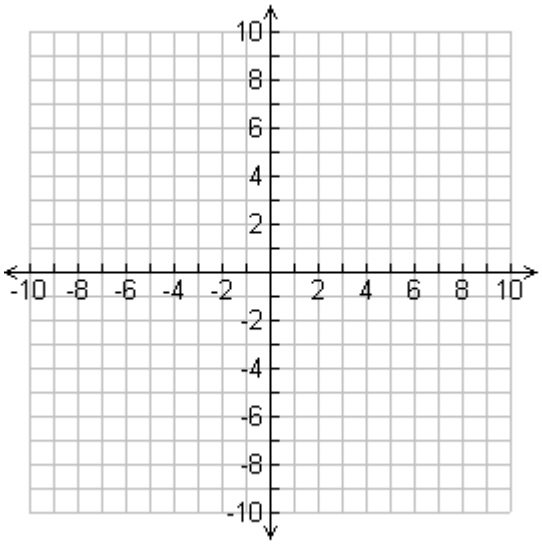
Range:



25) Graph: $y = -2\sqrt[3]{x-3} + 2$

Domain:

Range:

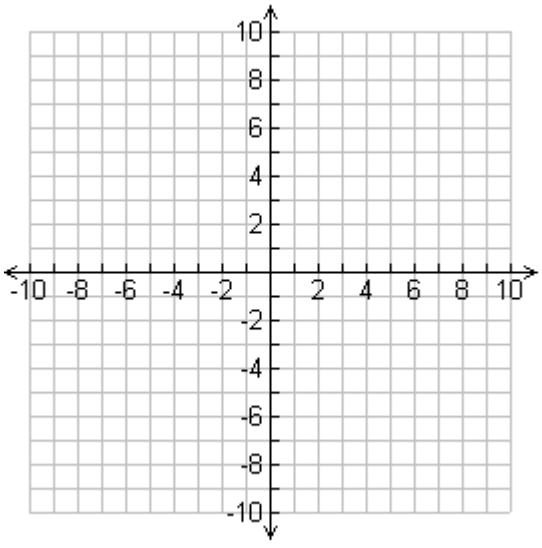


Rational Functions:

26) Graph: $f(x) = \dfrac{3}{x^2 - 4}$

Domain: Range:

VA: HA/SA:

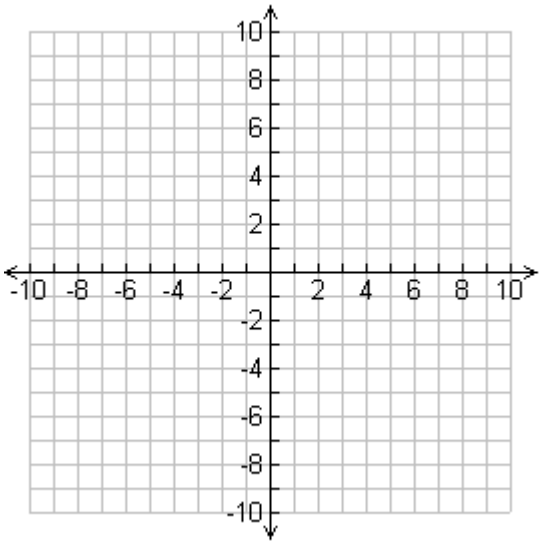


27) Graph: $f(x) = \dfrac{2x^2 - x - 3}{x^2 - 2x - 3}$

Domain: Range:

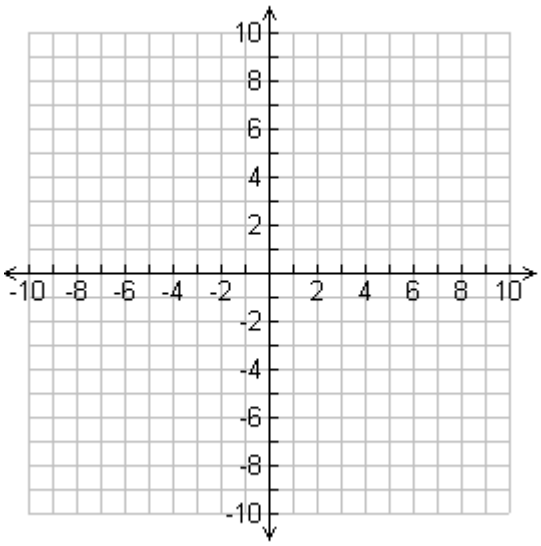
VA: HA/SA:

Hole:



28) Graph: $f(x) = \dfrac{x^2 - 3x - 10}{x - 2}$

Domain: Range:
VA: HA/SA:



Solving Equations:
Solve each equation. Check for extraneous solutions.

29) $16 = 3(x - 1) - (x - 7)$

30) $\dfrac{x}{3} = \dfrac{x}{2} - 2$

31) $\dfrac{3}{x+2} + \dfrac{2}{x-2} = \dfrac{8}{(x+2)(x-2)}$

32) $\dfrac{4}{x^2+3x-10} - \dfrac{1}{x^2+x-6} = \dfrac{3}{x^2-x-12}$

33) $(3x - 4)^2 = 16$

34) $7 - 7x = (3x + 2)(x - 1)$

35) $x^2 - 6x + 13 = 0$

36) $0 = x^3 - 4x^2 - 7x + 28$

37) $\sqrt{3x+7} = x - 1$

38) $\sqrt[3]{70 - 2x} - 10 = -6$

39) $3(x+1)^{\frac{1}{5}} + 5 = 11$

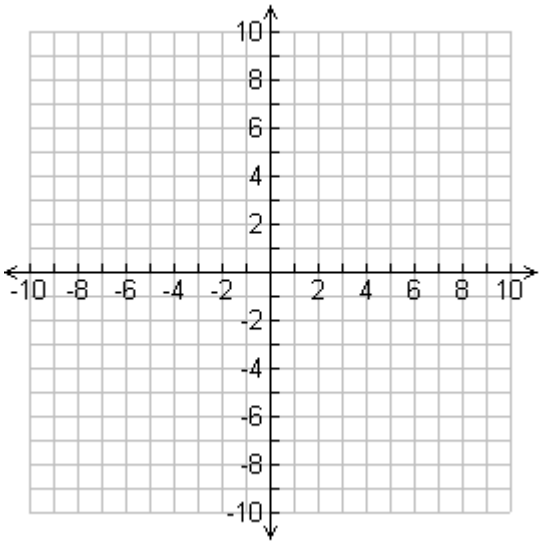
40) $\dfrac{x-2}{x+2} = \dfrac{3}{x}$

Exponentials and Logarithms:

41) Graph: $y = -2^{x+1} + 3$

Domain:

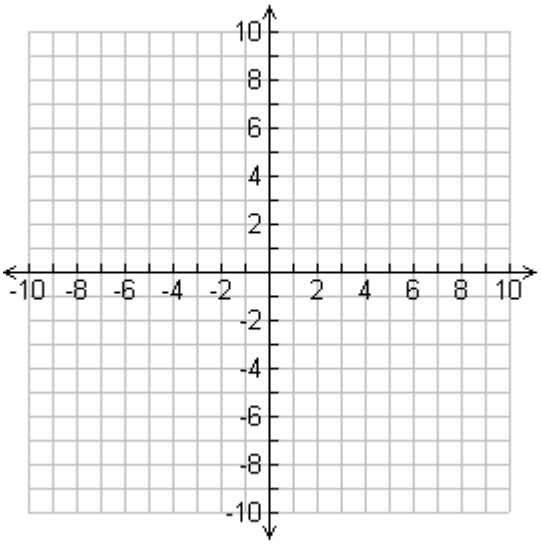
Range:



42) Graph: $y = \log_3(x+2) - 1$

Domain:

Range:



Evaluate:

43) $\ln e^7$ 44) $\log_5 125$ 45) $\log_{64} 4$ 46) $\log_3 \frac{1}{9}$ 47) $\ln 1$

Solve:

48) $4^{2x-1} = 32$ 49) $\log_2(x-2) + \log_2(x+5) = 3$

50) $6^{3x-5} + 18 = 52$ 51) $7\ln(3x+2) - 8 = 6$

A Strategy for Factoring a Polynomial

1. If there is a common factor, factor out the GCF.
2. Determine the number of terms in the polynomial and try factoring as follows:
   a. If there are two terms, can the binomial be factored by one of the following special forms?
      Difference of two squares: $A^2 - B^2 = (A + B)(A - B)$
      Sum of two cubes: $A^3 + B^3 = (A + B)(A^2 - AB + B^2)$
      Difference of two cubes: $A^3 - B^3 = (A - B)(A^2 + AB + B^2)$
   b. If there are three terms, is the trinomial a perfect square trinomial? If so, factor by one of the following special forms:
      $$A^2 + 2AB + B^2 = (A + B)^2$$
      $$A^2 - 2AB + B^2 = (A - B)^2.$$
      If the trinomial is not a perfect square trinomial, try factoring by trial and error.
   c. If there are four or more terms, try factoring by grouping.
3. Check to see if any factors with more than one term in the factored polynomial can be factored further. If so, factor completely.

Factor Completely:

52) $x^3 - x^2 - 5x + 5$ 53) $3x^2 - 25x - 28$ 54) $6x^2 - 17x + 12$

55) $36x^2 - 49y^2$ 56) $16x^4 - 81$ 57) $9x^2 - 6x + 1$

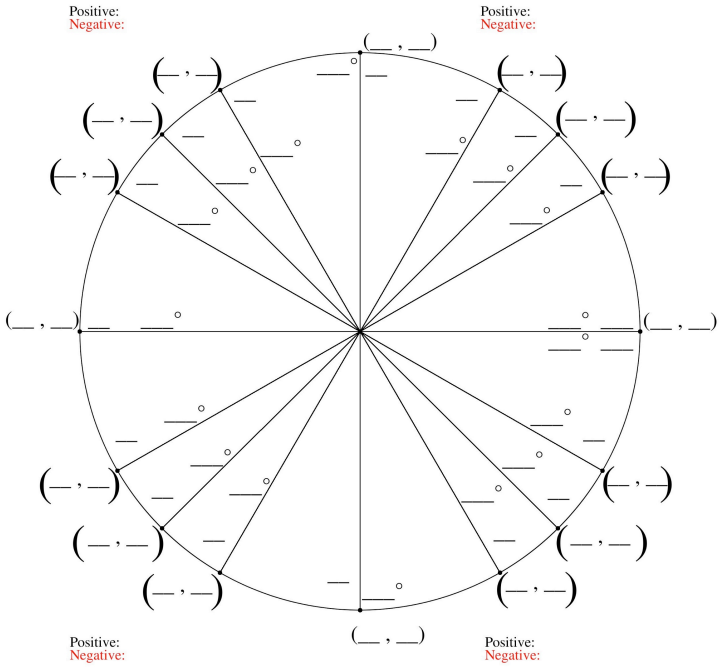
Factor Completely:

58) $64x^2+48x+9$ 59) $8x^3-1$ 60) $64x^3+27$

61) $x^3+2x^2-9x-18$ 62) $64x^2+25$

63) $x^2-12x+36-49y^2$ 64) x^3+2x^2-5x-6

Fill in The Unit Circle



Please make sure that you know how to complete the unit circle and know how to evaluate.

EXAMPLE: Evaluate each trigonometric expression (1) $\cos 120^o$ = _____ (2) $\sin\frac{\pi}{6}$ =_____.