

You are expected to complete all of the following problems over the summer and have them ready to turn in on the first day of school. This is your first grade. You should answer each problem and show your work. Points will be based on completion, accuracy, justification and work shown, and neatness. Your work should be easily read and followed and your answers should be easily located.

Linear Equations

Write the following equations in point-slope $(y - y_1 = m(x - x_1))$ form.

1. The line containing the point $(4, -7)$ and having a slope of $\frac{5}{2}$.
2. The line containing the point $(-13, 5)$ and parallel to $4x + 2y = -7$.
3. The line containing the point $(0, -2)$ and perpendicular to $x - 4y = 3$.
4. The line containing the point $(2, 9)$ and having a slope of 0 .
5. The perpendicular bisector of the segment between $(-5, 3)$ and $(12, 3)$.

Compositions of Functions

Given $f(x) = 4x - 1$ and $g(x) = x + 6$, find the following compositions.

6. $g(f(x))$
7. $f(g(x))$
8. $f(f(x))$
9. $g(f(g(x)))$

Basic Factoring

Factor each of the following as completely as possible.

10. $9x^3y - 25xy^3$

11. $x^3 + 7x^2 - 18x$

12. $8y^3 + 24y^2 - 7y - 21$

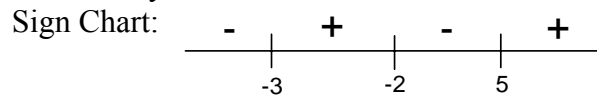
Function Analysis

Determine the domain and zeros of the each of the following functions, and use a sign chart to determine intervals where the function is positive and negative.

Example: $f(x) = \frac{x+3}{(x-5)(x+2)}$

Domain: Set denominator = 0 and solve. This is where the function is undefined.
So, domain is $(-\infty, -2) \cup (5, \infty)$.

Zeros: Numbers in the domain that make the numerator = 0. So, $x = -3$ is the only zero.



Positive: $(-3, -2) \cup (5, \infty)$ Negative: $(-\infty, -3) \cup (-2, 5)$

13. $P(x) = (x+5)(x-8)$

14. $C(x) = \frac{-6}{2x-3}$

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

16. $P(x) = \frac{6x^2 - 7x - 3}{2}$

17. $Q(x) = \frac{x-5}{(x+2)(x-5)}$

18. $T(x) = \frac{(x-3)(x+2)^2}{(x-10)^3}$

Mixed Review Problems

19. Find all real roots of $P(x) = 3x^3 + x^2 + 12x + 4$.

20. Find all real roots of $H(x) = 3x^2 - 6x - 45$.

21. Determine $f^{-1}(x)$ for $f(x) = \sqrt[3]{x-3}$.

22. Solve $\log_4(x) = 3$.

23. Express as a single logarithm: $3 \log_b(\sqrt[3]{x}) - 2 \log_b(x)$.

24. Solve $\log_3(x+3) + \log_3(x-3) = 4$.

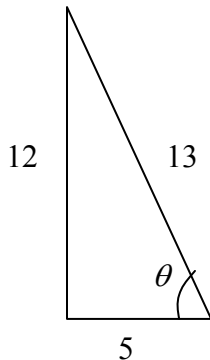
25. Given: $\ln y = 5$, find the exact value for y .

26. Given: $\ln y = 5x + \ln 7$, solve for y and simplify completely.

27. Solve $4^{x^2+4x} = \frac{1}{64}$.

28. Simplify $\frac{y - \frac{1}{y}}{y + \frac{1}{y}}$.

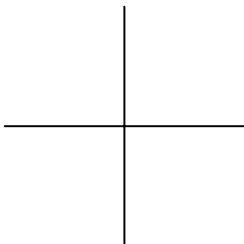
29. Find $\sin \theta$, $\cos \theta$, $\tan \theta$, $\sec \theta$, $\csc \theta$, and $\cot \theta$ for the triangle below.



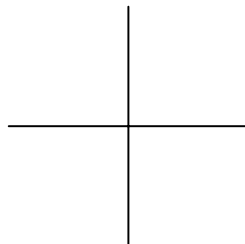
Graphing Parent Functions

Graph each function and clearly indicate the x - and y -intercepts on the axes provided.

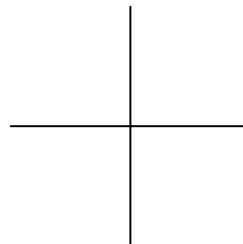
30. $y = x$



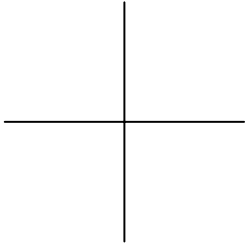
31. $y = x^2$



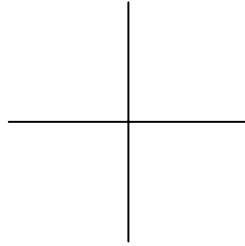
32. $y = x^3$



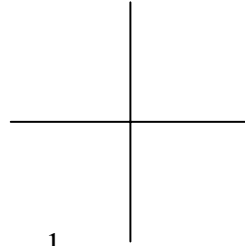
33. $y = |x|$



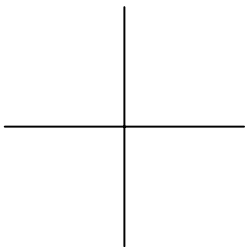
34. $y = \sin x$



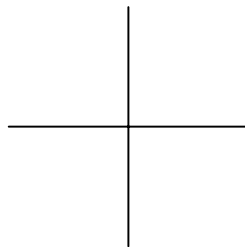
35. $y = \cos x$



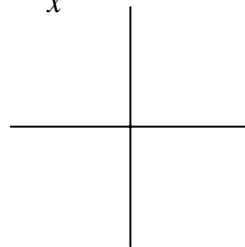
36. $y = 2^x$



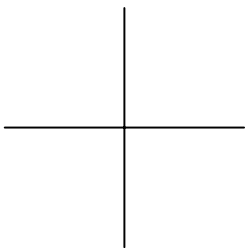
37. $y = \log_2 x$



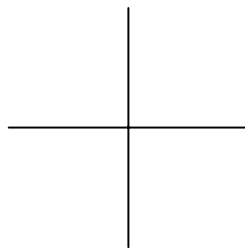
38. $y = \frac{1}{x}$



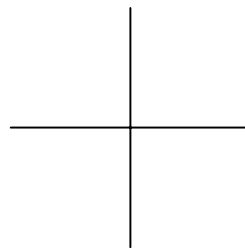
39. $y = \frac{1}{x^2}$



40. $y = \sqrt{x}$



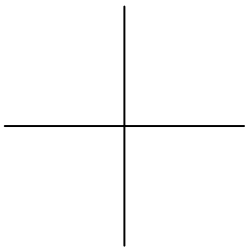
41. $y = \sqrt{3^2 - x^2}$



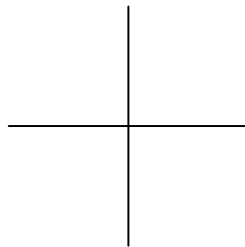
Graphing Transformations

Graph each function and clearly indicate the x - and y -intercepts on the axes provided.

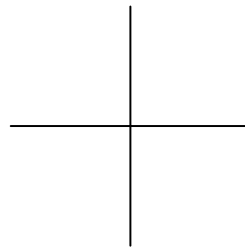
42. $y = -2x$



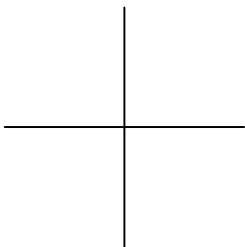
43. $y = \frac{1}{5}x$



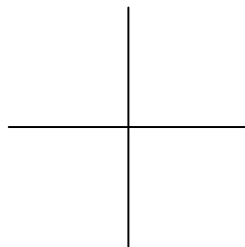
44. $y = x^2 - 5$



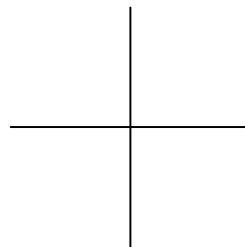
45. $y = 3 - x^2$



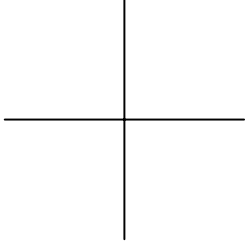
46. $y = -x^3$



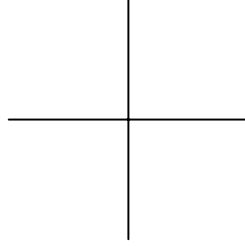
47. $y = x^3 - 5$



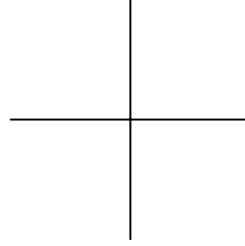
48. $y = -x^3 + 3$



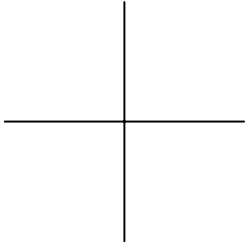
49. $y = \sqrt{x} - 2$



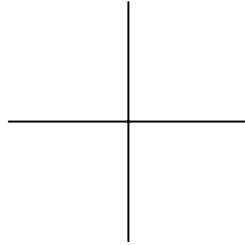
50. $y = 5 - \sqrt{x}$



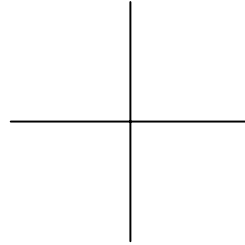
51. $y = \sqrt{x+2}$



52. $y = -\sqrt{4-x}$



53. $y = 3 - \sqrt{x}$



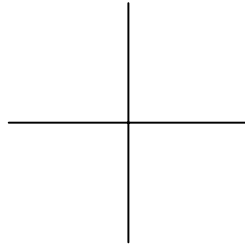
More Graphing

For problems 54 & 55,

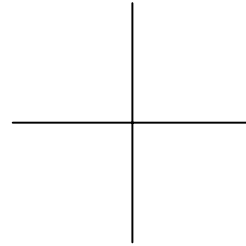
a) Sketch the graph of $f(x)$.

b) Sketch the graph of $|f(x)|$.

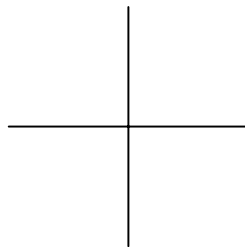
54. $f(x) = 2x + 3$ a)



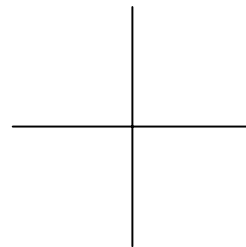
b)



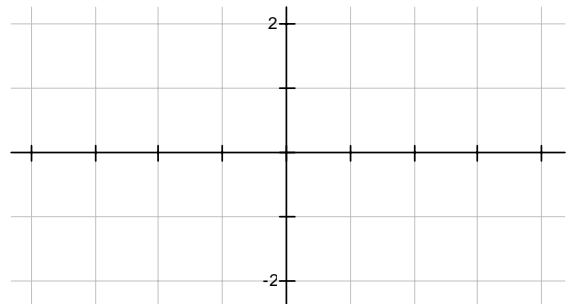
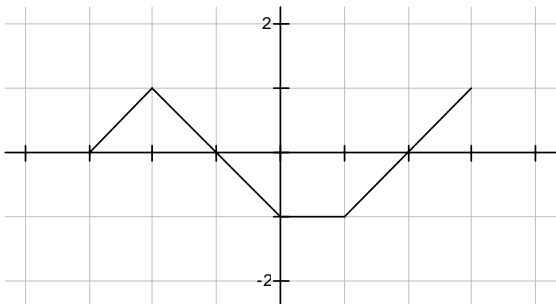
55. $f(x) = x^2 - 5x - 3$ a)



b)



56. The graph of $f(x)$ is shown below. Graph $|f(x)|$.



Calculator

These problems are designed to help you become comfortable with your graphing calculator. You may need to read the manual to understand how your calculator works. All answers should be rounded to the nearest 0.001.

57. Given: $f(x) = 3x + 2$

$$g(x) = -4x - 2$$

Find the point of intersection.

58. Given: $f(x) = x^2 - 5x + 2$

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

Find the coordinates of any point(s) of intersection.

59. Given: $f(x) = 3\sin 2x - 4x + 1$ from $[-2\pi, 2\pi]$

Find all roots.

Note: All trig functions are done in radian mode. It may be easier to find roots by graphing $y = 0$ as your second equation and finding point(s) of intersection.

60. Given: $f(x) = 0.7x^2 + 3.2x + 1.5$

Find all roots.

61. Given: $f(x) = x^4 - 8x^2 + 5$

Find all roots.

62. Given: $f(x) = x^3 + 3x^2 - 10x - 1$

Find all roots.

63. Given: $f(x) = |x| - |x - 6|$

Find all roots.

64. How many times does the graph of $y = 0.1x$ intersect the graph of $y = \sin(2x)$.

65. Given: $f(x) = x^4 - 7x^3 + 6x^2 + 8x + 9$

a) Determine the x - and y -coordinates of the lowest point on the graph.

b) Size the x -window from $[-10, 10]$. Find the highest and lowest values of $f(x)$ over the interval $[-10, 10]$.