Advanced Pre-Calculus
Summer Assignment 2018

Directions: Show out all work for every problem and do out on a separate piece of paper. All work must be done in pencil and all graphs should be graphed on graph paper.

LINEAR EQUATIONS:

1. Find the point slope, slope-intercept, and standard form of the equation of the line passing through the points (-1, 4) and (2, 0).

2. Write the slope-intercept form of the equation of the line through the point (3, -2) that is parallel to $5x - 4y = 8$. Then find the equation of the perpendicular line.

3. Write the linear function f such that $f(2) = -6$ and $f(-1) = 3$.

FACTORING:

4. $8y^3 + 4y$

5. $3ab - 9ac + 15ad$

6. $4x^2 + 4x + 1$

7. $6x^2 - 20x - 16$

8. $4a^2 - 64b^2$

9. $64a^3 + b^3$

10. $y^2 + 12y + 36 - 9a^2$

11. $2a^2 - 18a + 36$

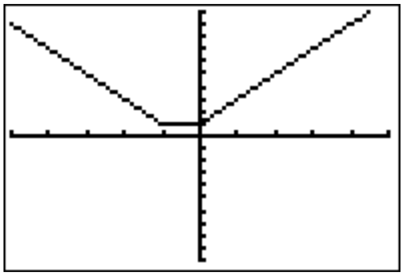
FUNCTIONS:

12. Evaluate the function at each specified value.

$fx= -x2+2x \qquad x\le -13x-1 \qquad x>-1$

a) f(-3) b) f(-1) c) f(0) d) f(4)

13. Determine the intervals over which the function is increasing, decreasing, or constant.



14. Is $f(x) = x^5 + 4x - 7$ even, odd, or neither?

15. Given: $h(x) = -x+1+9$
  a) Name the parent function.
  b) Describe the transformations.
  c) Sketch the graph.

16. Given $f(x) = x^2 + 3$ and $g(x) = 2x - 1$
  a) Find $(f + g)(x)$.
  b) Find $(f - g)(x)$.
  c) Find $(fg)(x)$.
  d) Find $(f /g)(x)$. What is the domain of $(f /g)(x)$?

17. Given $f(x) = 13x-3$ and $g(x) = 3x + 1$
  a) Find $(f\circ g)(x)$.
  b) Find $(g\circ f)(x)$.

18. Find the inverse of $f(x) = x - 7$ and verify that $f(f^{-1}(x)) = x$ and $f^{-1}(f(x)) = x$.

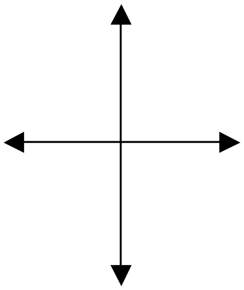
19. Given $f(x) = x+1$
  a) Find the inverse function of f.
  b) Graph both $f(x)$ and $f^{-1}(x)$ on the same set of coordinate axes.
  c) Describe the relationship between the graphs of $f(x)$ and $f^{-1}(x)$.
  d) State the domains and ranges of $f(x)$ and $f^{-1}(x)$.

20. Graph: $fx= 5x-3 \quad x\geq -1-4x+5 \quad x<-1$

TRIGONOMETRY:

21. Evaluate the following trigonometric functions and sketch the angle.

a.



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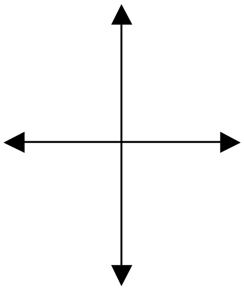

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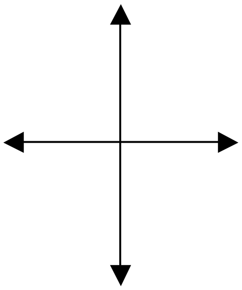

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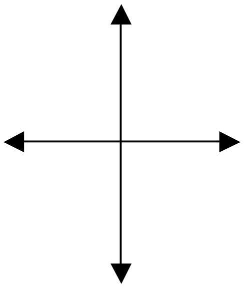

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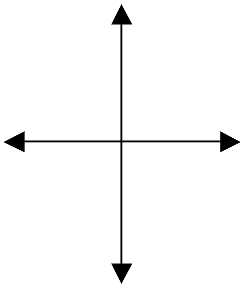

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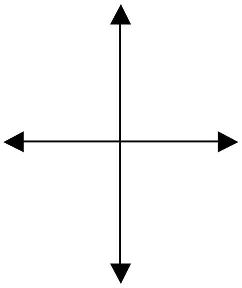

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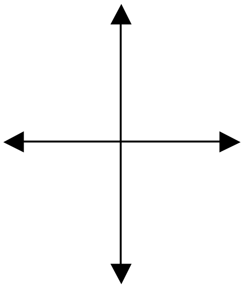

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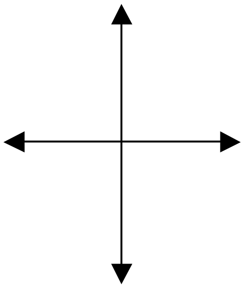

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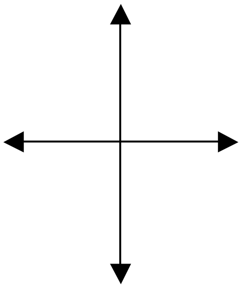

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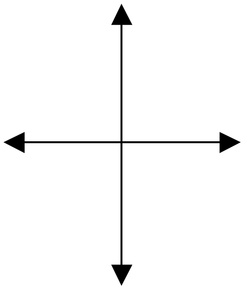

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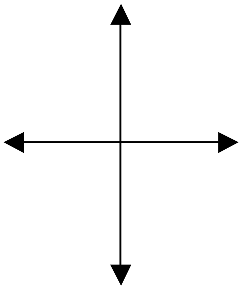

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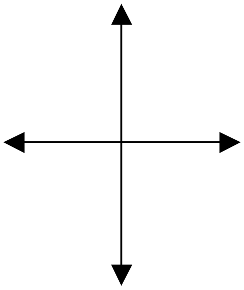

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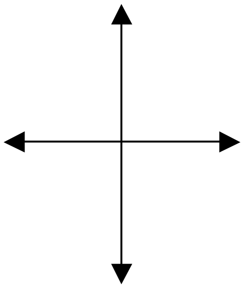

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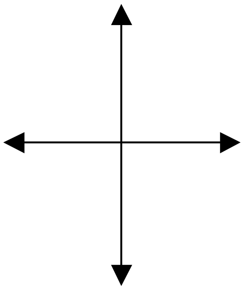

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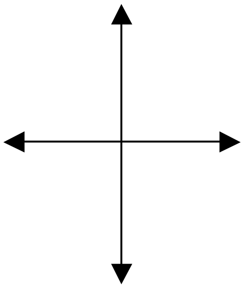

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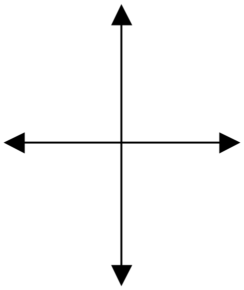

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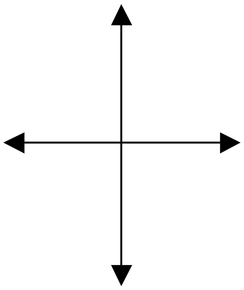

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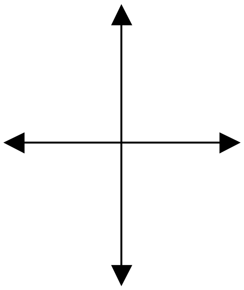

QUADRATICS:

22. Write *f*(x) = $-x^2 + 4x + 9$ in standard (vertex) form. Sketch the graph stating the vertex, axis of symmetry, and x- and y-intercepts.

23. Write the standard form of the equation form of the parabola for a quadratic that has vertex (3, -4) and a point at (2, 1).

24. Solve the quadratic equation $x^2 – 9x + 20 = 0$ by factoring, completing the square, and the quadratic formula.

POLYNOMIALS:

25. Find all the real zeros of the polynomial, describe the left and right end behavior and sketch the graph for $f(x) = x^3 - 4x^2 + 4x$.

26. Write the equation of a third-degree polynomial that has zeros of -5 and 2.

27. Divide $x^4 + 3x^2 + 1$ by $x^2 - 2x + 3$ using long division.

28. Use synthetic division to divide $5x^3 - 3x^2 + 9$ by $x + 2$.

29. Use synthetic division to show that $x = -4$ is a solution of $f(x) = x^3 + 3x^2 - 10x - 24$. Then find the remaining roots.

30. Use synthetic division to show that $(x - 2)$ and $(x + 3)$ are factors of $f(x) = x^4 + 3x^3 - 4x^2 - 12x$ and completely factor f(x). List all real zeros and sketch the graph of the polynomial.

31. Perform the indicated operation and write answer in a + bi form.

a. $(-8 + 4i)(5 - 7i)$ b. $(-1 + 3i) + (-9 - 6i)$

c. d.

32. Given $f(x) = 2x^3 - 7x^2 + 7x - 2$

a) List the possible rational zeros.

b) Determine the possible number of positive zeros and possible number of negative zeros.

c) Determine all the zeros.

33. Given that $-2 + 3i$ is a zero of the polynomial $f(x) = 2x^4 + 9x^3 + 24x^2 - 11x - 78$, find the remaining zeros.