Name _____

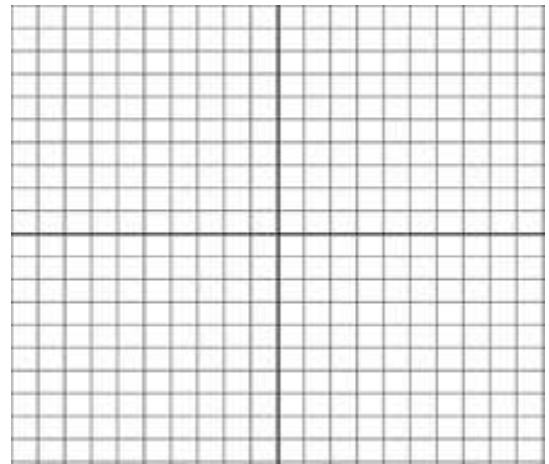## 4.1 Linear Functions

1. Find the following values, and graph the line:

$$5y - 2x = -5$$

a. X-intercept:_____

b. Y-intercept:_____

c. Slope:_____

d.
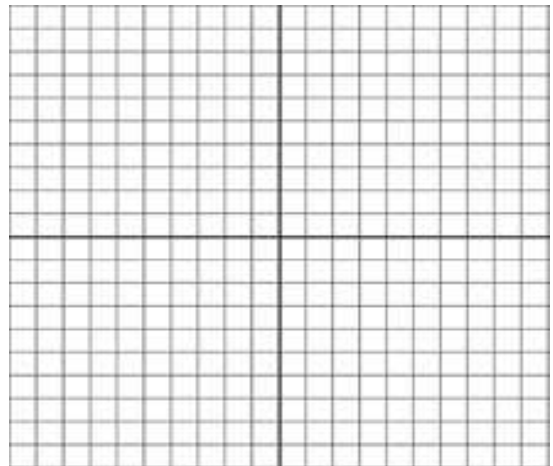
2. Find the following values, and write the equation of the line.

a. X-intercept:_____

b. Y-intercept:_____

c. Slope:_____

d. Equation:_____

3. For a linear function such that $f(3) = 4$, and $f(5) = 4$, in no particular order, give the **SLOPE, Y-INTERCEPT, EQUATION,** and **GRAPH** of the line.

Write the equation of the line that meets the following criteria:

    4.   Goes through the points (-1,-7) and (2,8).

    5.   Goes through the point (0,-4) and is parallel to $y = 3x - 11$

    6.   Has a slope of 3, and goes through the point (-9,1)

    7.   Perpendicular to the line $x = 5$, and goes through $(\frac{3}{5}, \frac{6}{17})$.

8.   Determine whether the given lines are parallel, perpendicular, or neither.

    a. $y = -2x - 5,\ \frac{1}{2}y = x + 3$ b. $3x - y = 4,\ 2y = 6x + 1$ c. $x = \frac{1}{2},\ 3y = 7$

9.   A certain company's yearly profits are steadily increasing. Year 1 they made $4,300. Comparatively, in year 3 the company profited $12,700. Come up with a linear model P(x) to represent this information, where P gives the profits at x years of operation, and then make the following predictions.

    a.   Linear Model: P(x) =

    b.   If this model is accurate, how much will they profit their 10th year?

    c.   If the trend continues, after how many years of operation will they profit $100,000 in a year?

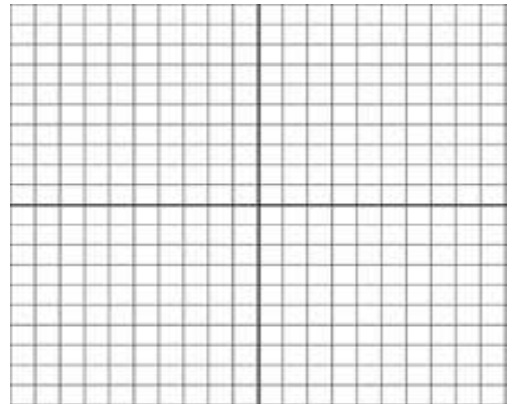   *(Round <u>up</u> to nearest whole year)*

5.1 Quadratic Functions

For each of the following quadratic functions, find the x and y intercepts, the vertex, and at least one other point. Be able to determine end behavior, domain, range, and its axis of symmetry, as well as be able to write it in vertex form, if it is not. Then GRAPH.
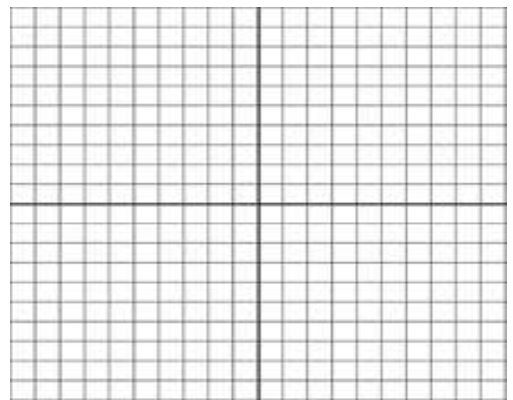
10. $f(x) = x^2 - 4x + 3$
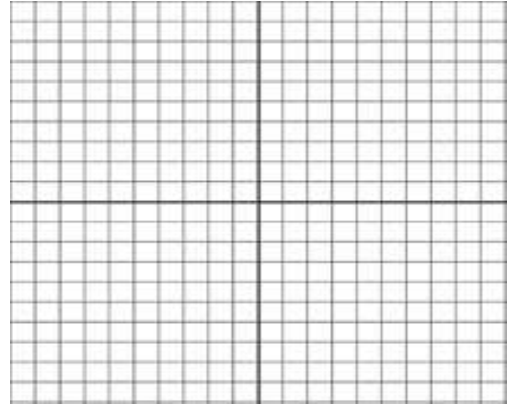
11. $f(x) = -2x^2 - 4x + 4$

12. $f(x) = (x - 1)^2 + 3$

5.2-5.5 Zeros and Graphing of Polynomial Functions

Be able to do <u>polynomial long division</u> and <u>synthetic division</u>. There are plenty of class examples we have

worked through that you may refer to, and you can look up additional examples in your book or online.

13.   Is $x + 6$ is a factor of $P(x) = x^3 + 4x^2 - 27x - 90$?   *Use synthetic division to answer.*

14.   Is $x - 2$ is a factor of $P(x) = x^3 + 4x^2 - 27x - 90$?   *Use the <u>remainder theorem</u> to*

answer—<u>not division</u>. (P(2)=...)

Given: $g(x) = 3x^4 - x^3 + 19x^2 - 9x + 9$

15.   Including complex and multiplicities, how many *total* zeros does the above $g(x)$ have?

16.   List all the possible rational zeros of $g(x)$ according to the Rational Zeros Theorem.
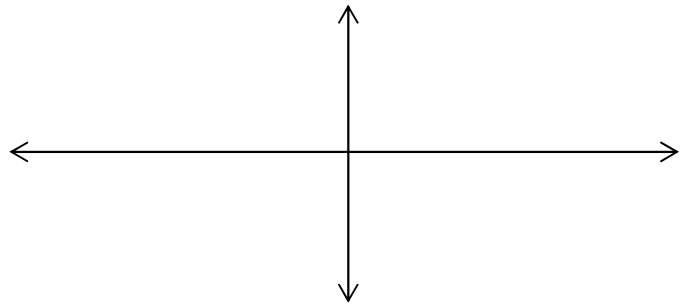
17.   According to Descartes' Rule of signs, how many negative real zeros/roots could $g(x)$ have? Does this

narrow down the list from the previous question?

Be able to find all zeros, the y-intercept, determine end behavior, and graph correctly. These 3 are from the notes and/or quiz.
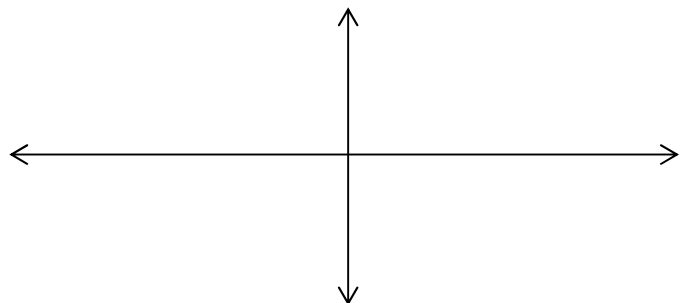
18.　　$g(x) = -x(x-3)^2(x+2)$
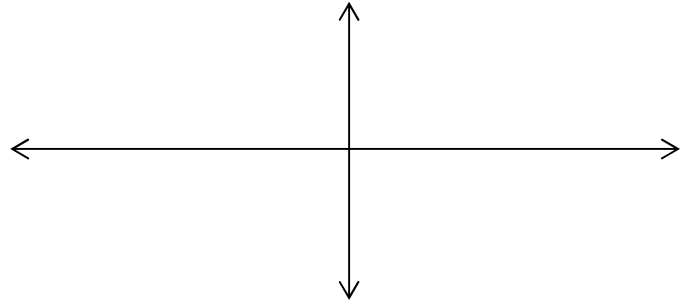
19.　　$P(x) = 3x^5 + x^4 + x^3 + 7x^2 - 24x + 12$　　Hint: -2 is a zero

20.　　$f(x) = 2x^4 - 2x^3 - 18x^2 + 18x$

5.6 Graphing of Rational Functions

You have worked through several of these in the 5.6 notes and homework, but here is another to try.

21. Graph $f(x) = \dfrac{x^2 - 4x - 5}{x^2 + x - 6}$ and provided the requested information.

Domain = _____

y-intercept = _____

Vertical asymptote(s): _____

x-intercept(s) = _____

Horizontal asymptote: _____

Holes: _____