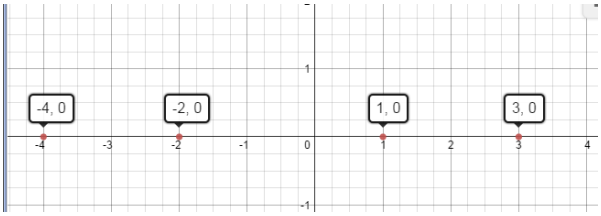
Steps for graphing polynomials:

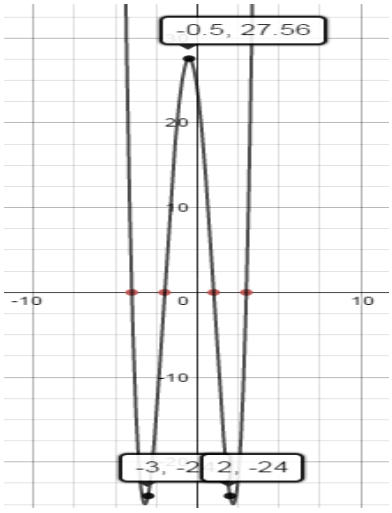
1. Calculate zeros
2. Plot zeros
3. Pick a point to the left of the last zero (calculate value of the function for that point)
4. Plot this point (if possible, if not indicate direction)
5. Pick a point to the right of the last zero (calculate value of the function for that point)
6. Plot this point (if possible, if not indicate direction)
7. Calculate x value(s) that is halfway between every zero
8. Calculate values for each point halfway between every zero
9. Plot these points
10. Connect your points

Example: $f(x) = (x-3)(x+2)(x-1)(x+4)$

1. Zeros: $x = 3, -2, 1, -4$
2. Plot zeros:



3. point to the left of the last zero: ***x = -5;***
   $f(-5) = ((-5)-3)((-5)+2)((-5)-1)((-5)+4) = 144$
4. Plot this point: ***It goes up***
5. point to the right of the last zero: ***x = 4;***
   $f(4) = ((4)-3)((4)+2)((4)-1)((4)+4) = 144$
6. Plot this point: ***It goes up***
7. Calculate x value(s) that is halfway between every zero
   a. Between (-4, 0) and (-2,0) is ***(-3,0), x = -3***
   b. Between (-2, 0) and (1,0) is ***(-0.5,0), x = -0.5***
   c. Between (1, 0) and (3,0) is ***(2,0), x = 2***
8. Calculate values for each point halfway between every zero
   a. $f(-3) = ((-3)-3)((-3)+2)((-3)-1)((-3)+4) = -24$
   b. $f(-0.5) = ((-0.5)-3)((-0.5)+2)((-0.5)-1)((-0.5)+4) = 27.5625$
   c. $f(2) = ((2)-3)((2)+2)((2)-1)((2)+4) = -24$
9. Plot these points:
10. Connect your points:



Assignment: Graph the following functions. In addition to graphing, perform sign analysis.

Note: Adjust your scale to make your coordinates fit. It is okay to have different scales on the x-axis and the y-axis.

1. $f(x) = x(x-2)(x+1)$
2. $f(x) = (x-3)(x-1)(x+1)$
3. $f(x) = (x-1)(x-2)(x+2)(x+1)$
4. $f(x) = x(x-2)(x+2)(x+1)$
5. $f(x) = (x-1)(x-2)(x+2)(x+1)$
6. $f(x) = x(x-4)(x-1)(x+1)$
7. $f(x) = x(x-2)(x-1)(x+1)(x+2)$
8. $f(x) = (x-2)(x+1)(x+1)(x-3)(x-2)$
9. $f(x) = x^3 - x^2$
10. $f(x) = x^3 - 4x^2 + 4x$
11. $f(x) = x^4 - 8x^2 + 16$
12. $f(x) = x^5 - 2x^3 + x$