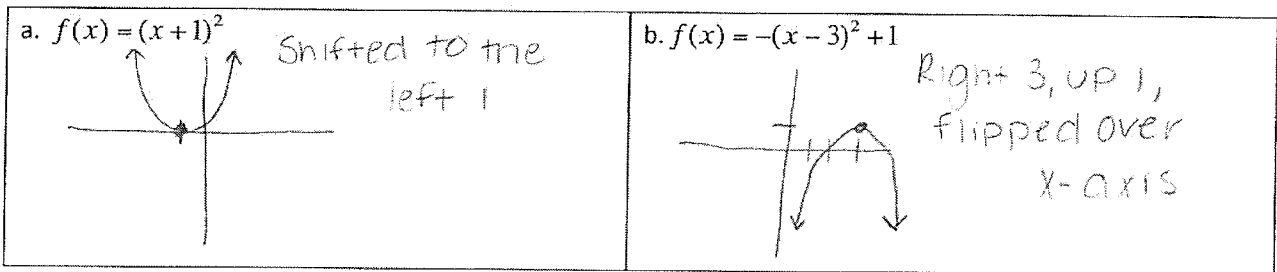


$$\frac{x(x+3)}{x(x+3)(x-2)} = \frac{x^2+3x}{(x^2+3x)(x-2)} = \frac{x^2+3x}{x^3-2x^2+3x^2-5x} \text{ key}$$

HONORS PRE-CALCULUS CHAPTER 2 REVIEW

1. Be able to sketch the graph of a function and describe how the graph is related to the graph of $y = x^2$.



2. Be able to describe the graph of the quadratic function and identify the vertex and x-intercept(s).

$f(x) = x^2 + 10x + 14$

$$x^2 + 10x + 25 = -14 + 25$$

$$(x+5)^2 = 11$$

$$(x+5)^2 - 11 = f(x)$$

Vertex = $(-5, -11)$

$$x+5 = \pm\sqrt{11}$$

$$x = \pm\sqrt{11} - 5$$

Hmm... What IS the standard form of a quadratic equation?

-5.19

3. Be able to write the equation of a parabola in standard form.

<p>Vertex: $(-2, 5)$; Point $(0, 9)$</p> $y = a(x+2)^2 + 5$ $9 = a(0+2)^2 + 5$ $4 = 4a$ $a = 1$ $y = (x+2)^2 + 5$	<p>Vertex: $(1/2, 1)$; Point $(-2, -21/5)$</p> $-\frac{21}{5} = a(-2 - \frac{1}{2})^2 + 1$ $-\frac{21}{5} = \frac{25}{4}a + 1$ $-\frac{26}{5} = \frac{25}{4}a$ $a = -\frac{104}{125}$ $y = -\frac{104}{125}(x - \frac{1}{2})^2 + 1$
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4. Be able to determine the x-intercepts of a function graphically and algebraically.

$f(x) = 2x^2 - 7x - 30 = 0$

$$(2x+5)(x-6)$$

$$2x+5 = 0 \quad x-6 = 0$$

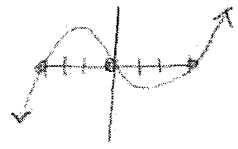
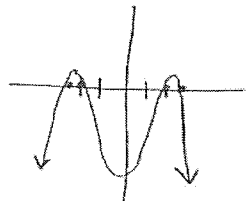
$$x = -\frac{5}{2} \quad x = +6$$

5. Be able to factor a function in order to find the zeros and their multiplicity.

<p>$f(t) = t^3 - 4t^2 + 4t$</p> $t(t^2 - 4t + 4)$ $t(t-2)(t-2)$ $t = 0, t = 2$	<p>$h(t) = t^2 - 6t + 9$</p> $(t-3)(t-3)$ $t = 3, \text{ multiplicity } 2$
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↓
multiplicity = 2

6. Be able to sketch the graph of a function by (a) applying the Leading Coefficient Test and (b) finding the zeros of a function.

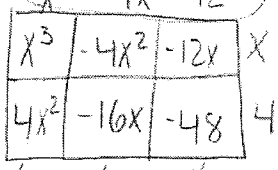
$f(x) = x^3 - 9x$ $X(X^2 - 9)$ $X(X+3)(X-3)$ $X=0, X=3, X=-3$ 	$f(x) = -x^4 + 9x^2 - 20$ $(-x^2 + 5)(x^2 - 4)$ $-x^2 + 5 = 0 \quad x^2 = 4$ $-x^2 = -5 \quad x = \pm 2$ $x^2 = 5$ $x = \pm\sqrt{5}$ 
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What IS the leading coefficient test?

The Factor Theorem states the following are equivalent:

$(x - a)$ is a factor of the polynomial $\rightarrow f(a) = 0 \rightarrow a$ is a zero of f

7. Be able to use division (synthetic/box method) to show that x is a solution of a polynomial equation, and use the result to factor the polynomial completely. Additionally, be able to list all real solutions of the equation.

$x^3 - 28x - 48 = 0$ and $x = -4 \rightarrow x + 4$ $f(-4) = 0$, so it is a solution $x^2 - 4x - 12 \rightarrow (x-6)(x+2)$ $x = 6, x = -2$ 	$48x^3 - 80x^2 + 41x - 6$ and $x = \frac{1}{2}$ <p style="text-align: center;">SKIP</p>
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8. Be familiar with operations with complex numbers. Perform the following operations and write the results in standard form.

- $5(-2+3i) - 10 + 15i$
- $(2-i)(4+3i) = 8 + 6i - 4i - 3i^2 = 8 + 2i + 3 = 11 + 2i$
- $(3+2i)(3-2i) = 9 - 6i + 6i - 4i^2 = 9 + 4 = 13$
- $4i(-1+5i) = -4i + 20i^2 = -20 - 4i$
- $(3+2i)^2(3+2i) = (9 + 6i + 6i + 4i^2)(3+2i) = (9 + 12i - 4)(3+2i) = (5+12i)(3+2i)$
- $\frac{2+3i}{4-2i} \cdot \frac{4+2i}{4+2i} = \frac{8+4i+12i+6i^2}{16+8i-8i-4i^2} = \frac{8+16i-6}{20} = \frac{2+16i}{20} = \frac{1}{10} + \frac{4}{5}i$

What is Standard Form for Complex numbers?

9. Be able to find ALL zeros of a polynomial function and write the polynomial as a product of linear factors.

$f(x) = (3x^3 - 5x^2) + (48x - 80)$ $x^2(3x - 5) + 16(3x - 5)$ $(x^2 + 16)(3x - 5)$ $x^2 + 16 = 0 \quad 3x - 5 = 0$ linear factors $x^2 = -16 \quad x = \frac{5}{3}$ $x = 4i, -4i$	$h(x) = x^2 - 4x + 1$ $\frac{4 \pm \sqrt{16-4}}{2} = \frac{4 \pm \sqrt{12}}{2}$ $= \frac{4 \pm 2\sqrt{3}}{2} = 2 \pm \sqrt{3}$
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linear factors: $(x-4i)(x+4i)(x-\frac{5}{3})$ linear factors: $(x-(2+\sqrt{3}))(x-(2-\sqrt{3}))$

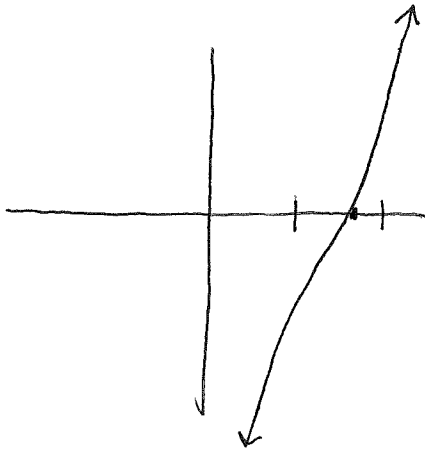
9. Be able to find ALL zeros of a polynomial function and write the polynomial as a product of linear factors.

$$f(x) = 3x^3 - 5x^2 + 48x - 80$$

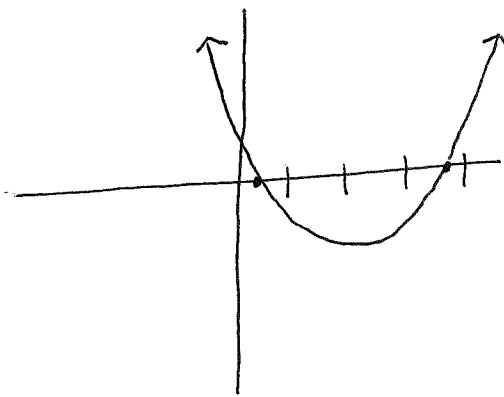
$$h(x) = x^2 - 4x + 1$$

10. Be able to sketch the graph of a polynomial function. (These are the same problems as before, you just need to graph them)

$$f(x) = 3x^3 - 5x^2 + 48x - 80$$



$$h(x) = x^2 - 4x + 1$$



11. Be able to sketch the graph of a rational function. You should determine the zeros, holes, asymptotes, and the domain.

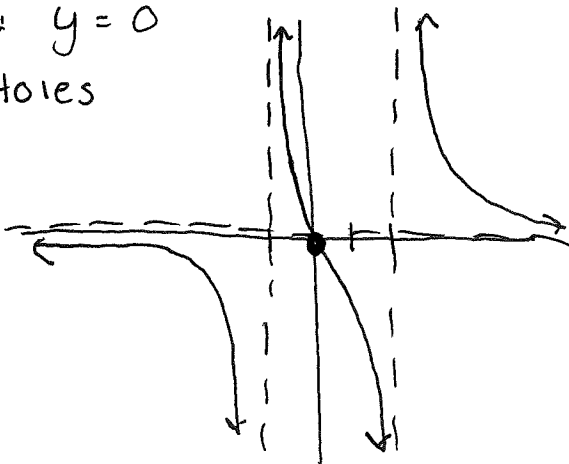
$$f(x) = \frac{3x}{x^2 - x - 2} = \frac{3x}{(x-2)(x+1)}$$

Zeros: $(0, 0)$

V.A.: $x = 2, x = -1$

H.A: $y = 0$

NO HOLES



$$h(x) = \frac{x^2 - 16}{x - 4} = \frac{(x+4)(\cancel{x-4})}{\cancel{x-4}} = x + 4$$

Zeros: $(-4, 0)$

NO V.A, H.A, or slant

Hole: $(4, 8)$

