Math 111 Cheat Sheet
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Arithmetic Operations

$$\frac{\frac{a}{b}}{\frac{c}{d}} = \frac{ad}{bc}$$

$$(a+b)(c+d) = ab+ac+bc+bd$$

Exponents

$$a^b a^c = a^{b+c}$$

$$(a^b)^c = a^{bc}$$

$$a^n b^n = (ab)^n$$

$$a^{-n} = \frac{1}{a^n}$$

$$\sqrt{a} = a^{1/2}$$

$$\sqrt[n]{a} = a^{1/n}$$

$$\sqrt[n]{a^m} = a^{m/n}$$

$$\sqrt[n]{ab} = \sqrt[n]{a}\sqrt[n]{b} = a^{1/n}b^{1/n} = (ab)^{1/n}$$

$$\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}} = \frac{a^{1/n}}{b^{1/n}} = \left(\frac{a}{b}\right)^{1/n}$$

Distance Formula

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Factoring Formulas

$$x^2 - a^2 = (x+a)(x-a)$$

$$(x+a)(x+b) = x^2 + (a+b)x + ab$$

$$(x+a)^2 = x^2 + 2ax + a^2$$

$$(x-a)^2 = x^2 - 2ax + a^2$$

$$x^3 + a^3 = (x+a)(x^2 - ax + a^2)$$

$$x^3 - a^3 = (x-a)(x^2 + ax + a^2)$$

Logarithms

$$log_b 1 = 0$$

$$log_b b = 1$$

$$log_b b^x = b^{log_b x} = x$$

$$log_b x^m = m log_b x$$

$$log_b(xy) = log_b x + log_b y$$

$$log_b\left(\frac{x}{y}\right) = log_b x - log_b y$$

Quadratic Formula

$$ax^2 + bx + c = 0$$

$$disc = b^2 - 4ac$$

$$x = \frac{-b \pm \sqrt{disc}}{2a}$$

Lines (Linear Functions)

$$y = mx + b$$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{rise}{run}$$

Parabolas (Quadratics)

$$y = ax^2 + bx + c$$
$$= a(x-h)^2 + k$$

$$Vertex @ (h,k) = \left(-\frac{b}{2a}, -\frac{disc}{4a}\right)$$

$$a < 0 \Rightarrow \text{``opens down''}$$

$$a > 0 \Rightarrow \text{``opens up''}$$

Absolute Value Eqs

$$|f| = a \Rightarrow f = a \ \ or \ \ f = -a$$
$$|f| < a \Rightarrow -a < f < a$$
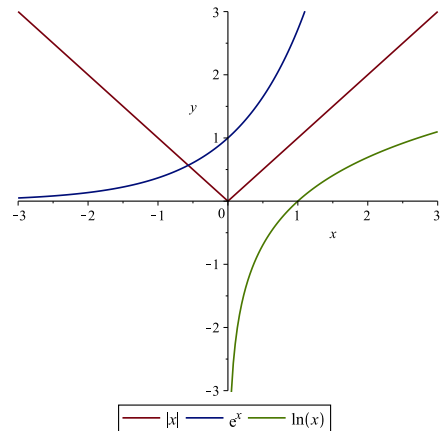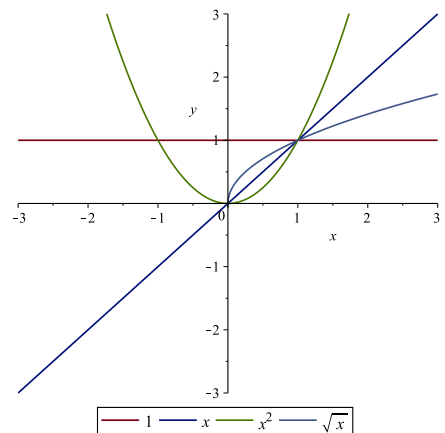$$|f| > a \Rightarrow f < -a \ \ or \ \ f > a$$

Circle (Not a function!)

$$(x-h)^2 + (y-k)^2 = r^2$$

$$Vertex @ (h,k), \ Radius = r$$

Tovar Notes:

1. $\frac{\frac{a}{b}}{\frac{c}{d}} = \frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c} = \frac{ad}{bc}$

2. $(a+b)(c+d) = ab + ac + bc + bd$ is called the "foil method"

3. $a^b a^c = a^{b+c}$: bases are the same

4. $a^n b^n = (ab)^n$: exponents are the same

5. Next couple: what do negative exponents do? What do rational exponents do?

6. Distance Formula: 2 points, P_1 located at (x_1, y_1) and P_2 located at (x_2, y_2)

1. $\frac{\frac{a}{b}}{\frac{c}{d}} = \frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c} = \frac{ad}{bc}$