STUDENT SUCCESS CENTER
THE UNIVERSITY OF ALABAMA IN HUNTSVILLE

Algebra Review

Quadratic Formula

The roots of $ax^2 + bx + c = 0$ (if $a \neq 0$ are: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Example) The roots of $x^2 + 3x - 1 = 0$ are $x = \frac{-3 \pm \sqrt{13}}{2}$

Exponents and Radicals

- $a^0 = 1$ if $a \neq 0$
- $a^{-x} = \frac{1}{a^x}$
- $a^{x+y} = a^x a^y$
- $a^{x-y} = \frac{a^x}{a^y}$
- $(\frac{a}{b})^x = \frac{a^x}{b^x}$
- $(a^x)^y = a^{xy}$
- $\sqrt{a} = a^{\frac{1}{2}}$
- $\sqrt[n]{ab} = \sqrt[n]{a}\sqrt[n]{b}$
- $\sqrt[n]{a^m} = a^{\frac{m}{n}} = (\sqrt[n]{a})^m$
- $(ab)^x = a^x b^x$
- $\sqrt[n]{a} = a^{\frac{1}{n}}$
- $\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$

Special Factors

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

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

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

Examples)

$x^2 - 9 = (x + 3)(x - 3)$

$x^3 - 8 = (x - 2)(x^2 + 2x + 4)$

$x^3 + 125 = (x + 5)(x^2 - 5x + 25)$

Algebraic Errors to Avoid

- $\frac{a}{x+b} \neq \frac{a}{x} + \frac{a}{b}$ To see this error, let $a = b = x = 1$
- $\sqrt{x^2 + a^2} \neq x + a$
- $a - b(x - 1) \neq a - bx - b$ Remember to distribute your negative, as this should be $a - b(x - 1) = a - bx + b$
- $\frac{(\frac{x}{a})}{b} \neq \frac{bx}{a}$ To divide fractions, invert and multiply, as this should be $\frac{(\frac{x}{a})}{b} = \frac{(\frac{x}{a})}{\frac{b}{a}} = \frac{x}{a} \cdot \frac{1}{b} = \frac{x}{ab}$
- $\sqrt{-x^2 + a^2} \neq -\sqrt{x^2 - a^2}$ We cannot factor out a negative sign from a square root
- $\frac{a+bx}{a} \neq 1 + bx$ We can only cancel factors of the entire numerator with factors of the denominator. This should be $\frac{a+bx}{a} = \frac{a}{a} + \frac{bx}{a} = \frac{1+bx}{a}$
- $(x^2)^3 \neq x^5$ This should be $(x^2)^3 = x^2x^2x^2 = x^6$