Math 1309
Concepts to Review

- Definition of Function and how to determine if a graph represents a function

Example: Is the circle with equation $x^2 + y^2 = 25$ a function? Why or why not?

- Factoring

Example: Factor the expressions $x^2 + x - 6$ and $2x^2 + 7x + 3$

- Reducing algebraic expressions to lowest terms

Example: Simplify the expression $\dfrac{x^2 + x - 6}{x + 3}$

- Graphs of the basic functions (these MUST BE MEMORIZED)

Linear: $f(x) = mx + b$

Quadratic: $f(x) = x^2$

Cubic: $f(x) = x^3$

Absolute Value: $f(x) = |x|$

Square Root: $f(x) = \sqrt{x}$

Exponential: $f(x) = e^x$

Logarithmic: $f(x) = \ln(x)$

- Exponential functions:

In general base a : $f(x) = a^x$ where a is a positive constant and $a \neq 0$

$0 < a < 1$ exponential decay (function is decreasing)

$a > 1$ exponential growth (function is increasing)

In particular base e: $f(x) = e^x$ (exp growth) and $f(x) = e^{-x}$ (exp decay)

Laws of Exponents

For any non-zero quantities a and b, and any positive integers n and m:

1) $a^n a^m = a^{n+m}$

2) $(a^n)^m = a^{nm}$

3) $\dfrac{a^n}{a^m} = a^{n-m}$

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

5) $\left(\dfrac{a}{b}\right)^n = \dfrac{a^n}{b^n}$

6) $a^{-n} = \dfrac{1}{a^n}$

7) $a^{1/m} = \sqrt[m]{a}$ (assume a>0)

8) $a^{n/m} = \sqrt[m]{a^n} = (\sqrt[m]{a})^n$ (assume a>0)

9) $a^0 = 1$

REMEMBER: $(a \pm b)^n \neq a^n \pm b^n$ and $\sqrt{a \pm b} \neq \sqrt{a} \pm \sqrt{b}$

Special Products

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

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

3) $(a+b)(a-b) = a^2 - b^2$

4) $(a+b)^3 = (a+b)(a+b)(a+b) = a^3 + 3a^2b + 3ab^2 + b^3$

5) $(a-b)^3 = (a-b)(a-b)(a-b) = a^3 - 3a^2b + 3ab^2 - b^3$

REMEMBER: $(a+b)^2 \neq a^2 + b^2$ and $(a+b)^3 \neq a^3 + b^3$

Lines

1) Slope of the line that goes through the points (x_1, y_1) and (x_2, y_2): $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

2) Slope-intercept form: $y = mx + b$

3) Slope-point form: $y - y_1 = m(x - x_1)$