Final Exam Review

Chapter 1

Exponents:

$$x^m x^n = x^{m+n} \qquad x^{-m} = \frac{1}{x^m}$$

$$\left(x^m\right)^n = x^{mn} \qquad \frac{x^m}{x^n} = x^{m-n}$$

$$x^0 = 1 \qquad \left(xy\right)^m = x^m y^m$$

$$\left(\frac{x}{y}\right)^m = \frac{x^m}{y^m}$$

Radicals:

$$\sqrt[b]{x^a} = x^{\frac{a}{b}}$$

Polynomials:

adding, subtracting, multiplying, dividing
factoring -- look for common factors first
three terms--trial and error
two terms--formula or common factor

Rational expressions (fractions with polynomials):

adding, subtracting, multiplying, dividing

Complex fractions (fraction over a fraction)

Rationalizing

Chapter 2

Solving equations:

linear
rational equations (fractions with variable in denominator)--either an answer you can use, an answer you can't use (no solution) or all real x except x =??

Applications

Solving quadratic equations-- $ax^2 + bx + c = 0$

(1) solve by factoring
(2) solve by completing the square (do not have to)
(3) solve by quadratic formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Imaginary numbers

Radical equations, absolute value equations, etc.

Inequalities, absolute value inequalities:

(1) $|x| < b$ **means** $-b < x < b$

(2) $|x| > b$ **means** $x < -b$ or $x > b$

Inequalities using a sign chart

Chapter 3

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

midpoint formula: $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$

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

Lines:

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

equations of lines:

(1) $y - y_1 = m(x - x_1)$

(2) $y = mx + b$

general form

Finding function values or expressions
Domain, range, increasing, decreasing...

Stretching, shifting, reflecting of graphs
piece-wise functions

Parabolas:

Standard form: $y = a(x-h)^2 + k$

Vertex: (h, k)

Quadratic form:

$y = ax^2 + bx + c$

Vertex: x-coord= $-\frac{b}{2a}$ or find average of x-int.

plug in to find y

Add, subtract, multiply, divide two functions

Composition of functions $f \circ g$

Chapter 4

Directly proportional: $y = kx$

Inversely proportional: $y = \frac{k}{x}$

Solving (graphing) inequalities using a sign chart

Chapter 9

Two equation/two unknowns

substitution/elmination

Chapter 5

Inverse functions

Exponential equation: $y = a^x$

Logarithmic equation: $x = a^y$ or $y = \log_a x$

Properties:

$(1)\ \log_a (uw) = \log_a u + \log_a w$

$(2)\ \log_a \left(\frac{u}{w}\right) = \log_a u - \log_a w$

$(3)\ \log_a u^c = c \log_a u$

Change of base formula:

$$\log_b u = \frac{\log_a u}{\log_a b}$$

Only formulas given:

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

$$A = Pe^{rt}$$

Any 3D volume/surface area with the exception of a box.