MIDTERM REVIEW STUDY GUIDE

1. Locus Definition

$$y = \pm\frac{1}{4p}(x-h)^2 + k$$

Vertex: (h, k) (located in the middle of the focus (point) and directrix (line))
p = half the distance between directrix and focus
When you draw the parabola, remember it "eats the focus"

2. Average Rate of Change

$$\frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

3. Exponent Rules

a) When multiplying, add exponents
b) When dividing, subtract exponents
c) Power to a Power $(2x^4y^2)^3 = 2^3x^{12}y^6 = 8x^{12}y^6$
Distribute (multiply) outside exponent to all inside exponents
c) To turn a radical into an exponent: $\frac{power}{root}$ $\sqrt{x} = x^{\frac{1}{2}}$

4. Functions

a) Even functions are symmetric to y-axis
b) Odd functions are symmetric to the origin
c) Transformations of Functions: in ( ) effects the x values (shifts left/right or r_{y-axis}) outside parentheses effects the y-values (shifts up/down or r_{x-axis})

5. Solving Equations

a) Factor: (GCF, DOTS, Trinomials, AC Method, Grouping, Cubes (SOAP))
b)Quadratic Formula (On reference sheet)

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

**Use when you can't factor a quadratic (x^2 function)
**Use when it says find the roots/zeros in simplest radical form or simplest "$a + bi$" form
c) Solving Radical Equations (Isolate radical, square both sides, solve & check)

MIDTERM REVIEW STUDY GUIDE

6. Sequences and Series Formulas (on reference sheet)

a) Arithmetic Sequence: $a_n = a_1 + (n-1)d$

b) Geometric Sequence: $a_n = a_1 r^{n-1}$

c) Geometric Series: $S_n = \frac{a_1 - a_1 r^n}{1-r}$

d) Arithmetic Series: $S_n = \frac{n(a_1 + a_n)}{2}$ **(**not on reference sheet**)**

e) Arithmetic Recursive Form: $a_n = a_{n-1} + d$

f) Geometric Recursive Form: $a_n = r \cdot a_{n-1}$

g) Sigma Notation/Summation: $\sum$

7. Exponential Functions:

a) Writing the equation in $y = a(b)^x$ form;

a = y-intercept b = rate (multiplier)

Find b first: Divide the x's and y's
Work backwards on chart to find the y-intercept or plug in a point.
or
Stat edit
Stat Calc #0 (ExpReg)

Percent Rate: Amount over/under 1
Ex1. $y = 3(1.2)^x$ has a 20% increase
Ex2: $y = 3(0.4)^x$ has a 60% decrease (1-0.4)

b) Common Bases

c) Growth/Decay Formulas: $A(t) = P(1 \pm r)^t$ or $A(t) = P(1 \pm r)^{\frac{t}{every}}$

$A(t) = final\ amount$ $every = growth\ period$

$P = initial\ amount$

$r = rate$ (% as a decimal)

$t = time$ (make sure the time periods are the same)

8. Polynomials

a) Long Division
b) Synthetic Division (use only the coefficients. Can't use if the factor has a coefficient >1)

MIDTERM REVIEW STUDY GUIDE

c) Remainder Theorem (plug the value of x into the equation or graph. It's a factor if the remainder is 0)
d) Write the equation of a polynomial given zeros/multiplicity
e) End behavior