PreCalc 3.1 Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Quadratic Functions and Models

Objectives:

1. Graph a quadratic using transformations
2. ID the vertex and axis of symmetry
3. Graph the quadratic using vertex, axis, and intercepts
4. Use the max/min value to solve applied problem
5. Use a graphing utility to find the line of best fit

Notes:

\***Quadratic equation** is a second-degree polynomial in one variable whose graph is a parabola

\***Standard form** of a quadratic: f(x) = ax² + bx + c , where a, b, and c are real #’s and a≠0

**Axis of Symmetry**: vertical line at x = $-\frac{b}{2a}$

**Vertex**: Minimum if a > 0 , graph turns up

 Maximum if a < 0 , graph turns down

 Vertex is at: ($\frac{-b}{2a}$, f( $\frac{-b}{2a}$))

**Y-intercept**: (o, c)

**X-intercepts**: the determinant tells you what kind of x-intercepts, if any, that you have

 If b² - 4ac > 0 the there are two x-intercepts

 If b² - 4ac = 0 then there is one x-intercept

 If b² - 4ac < 0 then there are no x-intercepts

 To find the **x-intercepts**, either factor the quadratic and solve or use the quadratic formula

\***Vertex Form** of a quadratic equation: f(x) = a(x-h)² + k , where the **vertex is (h,k)**

- Vertex form Is found by completing the square and then graph by doing transformations (Ch2)’

1. Use the vertex, axis of symmetry, and intercepts 2. Use Transformations

 **Axis of symmetry**: x = h **x-intercepts**: solve for x once the equation is in vertex form

 If |a| > 1 (Vertical Stretch) ; If 0 < |a| < 1 (Vertical Compression)

Ex1) Graph f(x) = x² -2x -3 by keeping in standard form and finding the following information.

AOS (axis of symmetry): Vertex:

y-int: x-int:

Domain: Range:

Increasing: Decreasing:

Ex2) Complete the square, if necessary, to put in vertex form and then graph using transformations.

1. $f\left(x\right)=2x^{2}-3$ B.) $f\left(x\right)=-2x^{2}+6x+2$

Ex3) A farmer has 2000 meters of fencing to enclose a rectangular plot that borders on a straight highway. If the farmer does not fence in along the highway, what is the largest area that can be enclosed?