

Graphs of Quadratic Functions

- ◆ Steps to sketch parabolas, $f(x) = ax^2 + bx + c$
 - Step 1: Determine whether the parabola opens up or down and if the vertex a minimum or a maximum.
 - The parabola opens up if $a > 0$ (so the vertex is a minimum) and down if $a < 0$ (so the vertex is a maximum).
 - Step 2: Find the **ordered pair** of the vertex.
 - The vertex of a parabola is $\left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right)\right)$
 - Step 3: Find the y-intercept of the parabola. Write as an **ordered pair**.
 - Let $x=0$ and solve for y . Notice this always gives you $y=c$, so the y-intercept is $(0, c)$.
 - Step 4: Find the x-intercept(s) of the parabola. Write as an **ordered pair(s)**.
 - Let $y=0$ and solve for x . You can either try to factor or just use the quadratic formula (I suggest the latter).
 - Step 5: Put together all of the above information to sketch a graph of the parabola
- ◆ Here is a sample of how I would phrase such a question on, say, an exam I might be writing...

Example: Consider the function $y = f(x) = ax^2 + bx + c$

- a. [2] Does the parabola open up or down? Is the vertex a minimum or maximum? Justify your answers.
- b. [2] Find the coordinates of the vertex. Write the answer as an ordered pair.
- c. [1] Find the y-intercept. Write the answer as an ordered pair.
- d. [3] Find the x-intercepts, if any exist. Write the answer(s) as an ordered pair(s).
- e. [4] Using the above answers, graph the function. Label the vertex, the y-intercept, and the x-intercept(s). Be sure to label and scale the axes!