Bellwork 11/4/15

Find the product:

\[(x + 4)(x - 7)\]
\[4x(x + 6)\]
\[(-4a + 5b)(-a + 3b)\]

4-2: STANDARD FORM OF A QUADRATIC FUNCTION

Review: Vertex Form

\[f(x) = (x - h)^2 + k\]

Vertex:
Axis of symmetry:
Max or min?
Domain:
Range:

Example: Identify the vertex and the axis of symmetry of each parabola.

***Standard form: \(f(x) = ax^2 + bx + c***

The axis of symmetry is the line \(x = -\frac{b}{2a}\). The \(x\)-coordinate of the vertex is \(-\frac{b}{2a}\).

The \(y\)-coordinate of the vertex is \(f(-\frac{b}{2a})\), the vertex is \((-\frac{b}{2a}, f(-\frac{b}{2a}))\).

The \(y\)-intercept is \(f(0)\).

Example: Identify the vertex and the axis of symmetry of each parabola.

a. \(y = 3x^2 + 18x + 32\)
   - \(x = -\frac{b}{2a} = -\frac{18}{2*3} = -3\)
   - The vertex is \((-3, f(-3))\).

b. \(y = 4x^2 + 2x + 3\)
   - \(x = -\frac{b}{2a} = -\frac{2}{2*4} = -\frac{1}{4}\)
   - The vertex is \((-\frac{1}{4}, f(-\frac{1}{4}))\).

Write function in vertex form:

\[y = 3(x - 2)^2 - 3\]

Vertex: \((2, -3)\)
Axis of symmetry: \(x = 2\)
Max or min? Min
Domain: All real numbers
Range: \(y \geq -3\)

Example: Identify the vertex and the axis of symmetry of each parabola.

- This is the graph of \(y = 2x^2 - 8x + 5\).
Example 2: Graph each function.

a. \( y = -x^2 + 3x + 1 \)

\[ x = \]

\[ f(x) = \]

vertex: y-intercept:

b. \( y = 2x^2 + 4x - 4 \)

\[ x = \]

\[ f(x) = \]

vertex: y-intercept:

Example 2: Graph each function.

b. \( y = 2x^2 + 4x - 4 \)

\[ x = \]

\[ f(x) = 2(x - \frac{1}{2})^2 - \frac{9}{2} \]

vertex: y-intercept:

REVIEW:

<table>
<thead>
<tr>
<th>Standard form?</th>
<th>Vertex form?</th>
</tr>
</thead>
<tbody>
<tr>
<td>( f(x) = ax^2 + bx + c )</td>
<td>( f(x) = (x - h)^2 + k )</td>
</tr>
</tbody>
</table>

***Standard form: \( f(x) = ax^2 + bx + c \)***

\[
\text{Vertex: } \left( \frac{-b}{2a}, f\left( \frac{-b}{2a} \right) \right) \quad \text{Axis of symmetry: } \ x = \frac{-b}{2a}
\]

Max: range: \( y \leq f\left( \frac{-b}{2a} \right) \) OR

Min: range: \( y \geq f\left( \frac{-b}{2a} \right) \)

Example 3: What are the vertex, the axis of symmetry, the maximum or minimum value, and the range of each parabola?

a. \( y = 3x^2 + 6x - 9 \)

vertex: axis of symmetry: max or min: range:

\[
\left( -1, -6 \right)
\]

b. \( y = 4x^2 - 8x - 15 \)

vertex: axis of symmetry: max or min: range:

\[
\left( \frac{1}{2}, -\frac{41}{4} \right)
\]