MA 220 Lesson 29, Section 3.7 (part 1)

Curve Sketching:
1) Find (if possible) any **y-intercept or x-intercepts**. To find *y*-intercept, let $x = 0$ and solve. To find *x*-intercept(s), let $y = 0$ and solve. (Finding *x*-intercept(s) is not always be easy to accomplish.)
2) Use the first derivative to determine intervals where the graph will be **increasing** and those where it will be **decreasing**. You can also use this first derivative information, where increasing/decreasing 'changes' to find **any relative extrema** (relative maximums or relative minimums.)
3) Use the second derivative to determine any intervals where the graph will be **concave upward** or any intervals where the graph will be **concave downward**. Where concavity 'changes' will also allow you to find **any points of inflection**.
4) If you are sketching a rational function, you will want to find the equations of any **vertical or horizontal asymptotes**.

Key hints to sketching reasonable graphs:
1) **Use graph paper or make very, very neat hand-drawn straight axes.**
2) **Use a uniform equally spaced scale on each axis. Choose a scale that is reasonable for each axis.**
3) **Locate any intercepts, relative extrema, or point(s) of inflection.**
4) **Draw any asymptotes.**
5) **Keeping in mind where the graph is increasing/decreasing and concave upward/downward, carefully and as neatly as possible, sketch your graph in pencil.**
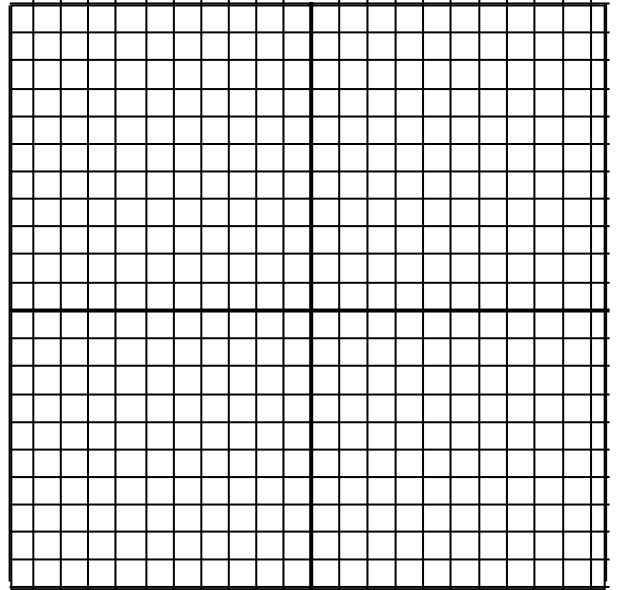
Example 1: $y = -x^2 + 2x - 5$

Using the guidelines above, find the relevant information and sketch the graph for this function.
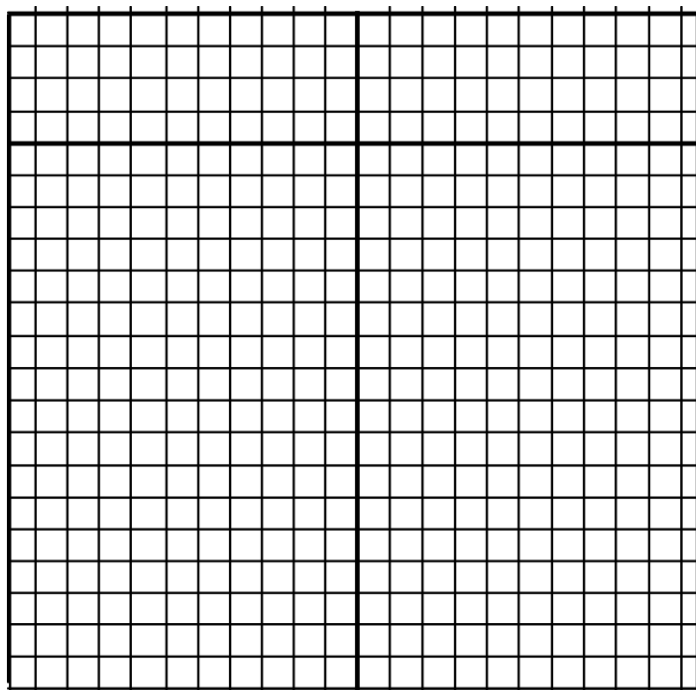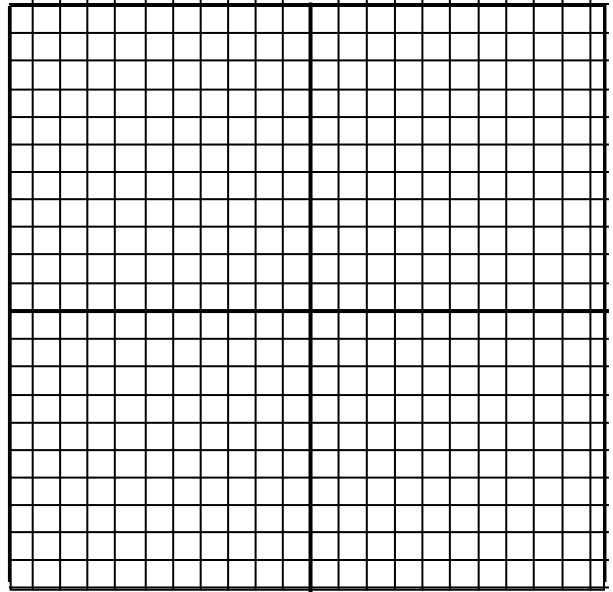
Example 2: $y = 2x^3 + 3x^2 - 12x - 7$

Using the guidelines on the previous page, find the relevant information about the graph of this function and sketch the graph.

Example 3: $g(x) = x^4 + 8x^3 + 18x^2 - 8$

Using the guidelines on the previous page, find the relevant information about the graph of this function and sketch the graph.

Example 4: $y = (x-2)^4$

Using the guidelines on the previous page, find the relevant information about the graph of this function and sketch the graph.