MA 220 Lesson 30, Section 3.7 (part 2)

Curve Sketching:

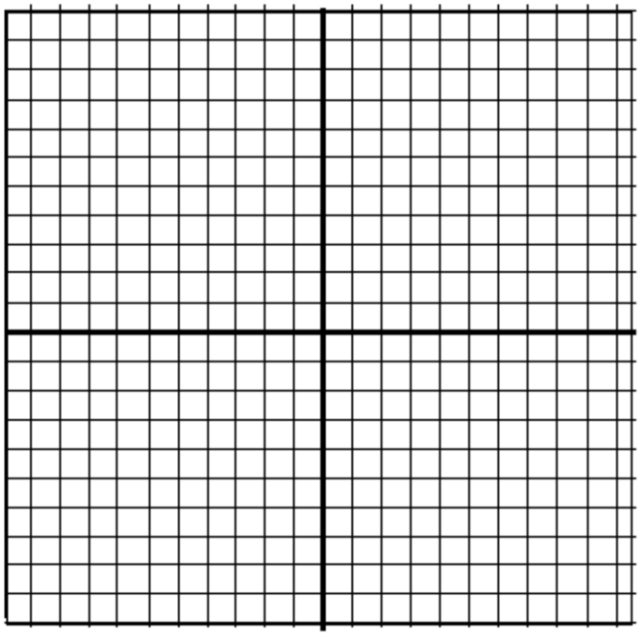
1) Find (if possible) any ***y*-intercept or *x*-intercepts**. To find *y*-intercept, let $x = 0$ and solve. To find *x*-intercept(s), let $y = 0$ and solve. (Finding *x*-intercept(s) is not always be easy to accomplish.)
2) Use the first derivative to determine intervals where the graph will be **increasing** 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.

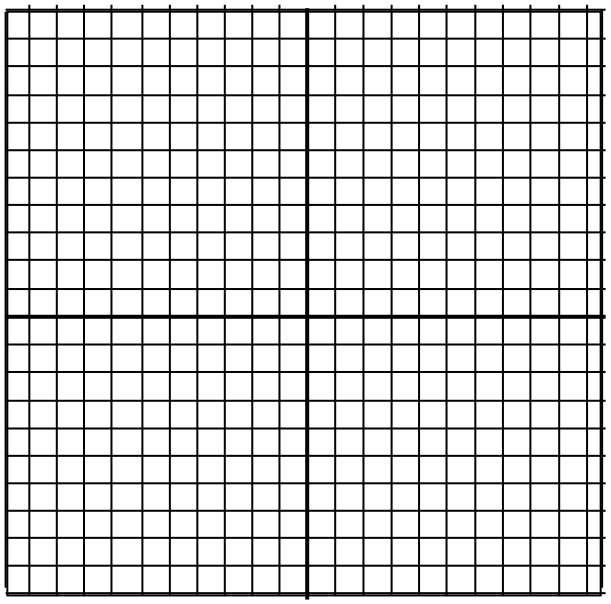
Example 1: $f(x) = \dfrac{x^2}{x-1}$

Using the guidelines for curve sketching, find the relevant information and sketch the graph for this function.



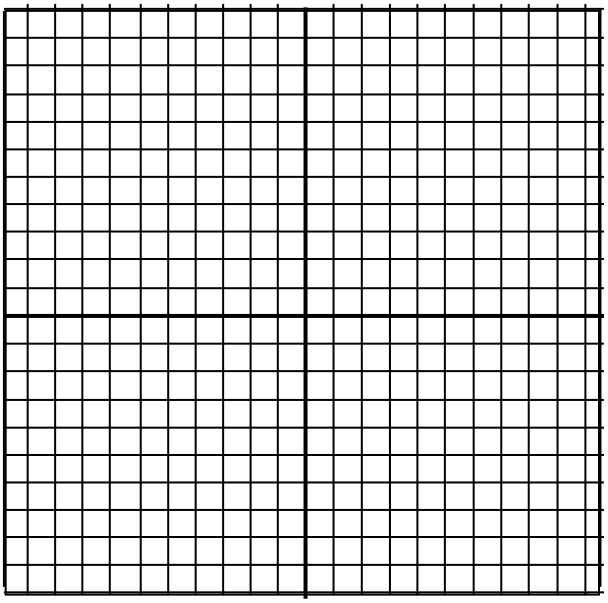
Example 2: $y = \dfrac{2}{x^2 + 1}$

Using the guidelines for curve sketching, find the relevant information about the graph of this function and sketch the graph.



Example 3: $g(x) = \dfrac{x}{(x+1)^2}$

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



Example 4: $y = \dfrac{x^2 - 3x}{x + 1}$

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