Graphing functions

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1. Fill in the following table:

	$f'(x) > 0$	$f'(x) < 0$
$f''(x) > 0$		
$f''(x) < 0$		

   In each cell, write whether f is increasing/decreasing, concave up/concave down, and sketch the shape of f.

2. Sketch a function f with the following properties:

$x < -1$	$f'(x) < 0$ and $f''(x) < 0$
$-1 < x < 2$	$f'(x) < 0$ and $f''(x) > 0$
$2 < x < 8$	$f'(x) > 0$ and $f''(x) > 0$
$8 < x < 10$	$f'(x) > 0$ and $f''(x) < 0$
$x > 10$	$f'(x) > 0$ and $f''(x) > 0$

3. Sketch the graph of $f(x) = x^4 - 6x^2$ by doing the following:

   (a) Find all critical points and possible inflection points of f and plot them on a *single* number line.

   (b) Mark whether each interval is increasing/decreasing, concave up/concave down and sketch the shape of the graph on that interval.

   (c) Identify all local extrema and inflection points (x- and y-coordinates) and plot them on a set of coordinate axes.

   (d) Also find and plot all zeros of f.

   (e) "Connect the dots" using the shapes you drew in part (b). Make sure your graph goes through all the zeros, critical points, and inflection points.

4. Sketch the graph of $f(x) = \frac{x^2}{x-2}$ by following the steps in problem 3. In part (d), also mark any vertical asymptotes and note the end behavior of f—are there any horizontal or oblique asymptotes?