Reading Stewart §3.3.

1. Let $f(x) = x^3 - 3x^2 - 9x + 5$. Find where f is increasing or decreasing, where f is concave up or down, as well as all local maxima, local minima, and inflection points of f. Then use this information to sketch $y = f(x)$.

2. Let $g(x) = x^4 - 8x^2 + 10$. Find where g is increasing or decreasing, where g is concave up or down, as well as all local maxima, local minima, and inflection points of g. Then use this information to sketch $y = g(x)$.

3. Find all the local maxima and minima of $h(x) = \frac{x^2}{x-1}$ using the First Derivative Test.

4. Sketch the graph of a function $F(x)$ that satisfies the following properties:

   - $F'(-1) = F'(2) = F'(4) = 0$,
   - $F'(x) > 0$ for all x with either $x < -1$ or $2 < x < 4$,
   - $F'(x) < 0$ for all x with either $-1 < x < 2$ or $x > 4$,
   - $F''(x) > 0$ for all x with $0 < x < 3$, and
   - $F''(x) < 0$ for all x with $x < 0$ or $x > 3$.

5. The graph of the derivative f' of a continuous function f is shown.

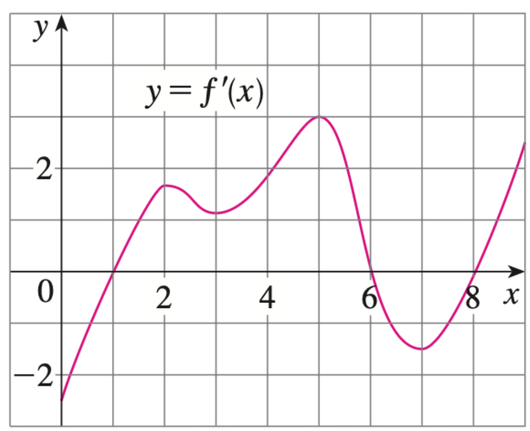
   (a) On what intervals is f increasing? Decreasing?

   (b) At what values of x does f have a local maximum? Local minimum?

   (c) On what intervals is f concave upward? Concave downward?

   (d) State the x-coordinate(s) of the point(s) of inflection.

   (e) Assuming that $f(0) = 0$, sketch a graph of f.



Note Read the problem carefully; in particular, the graph is **not** the graph of $f(x)$, but rather the graph of $f'(x)$. But you are asked about properties of $f(x)$, whose graph is not shown.