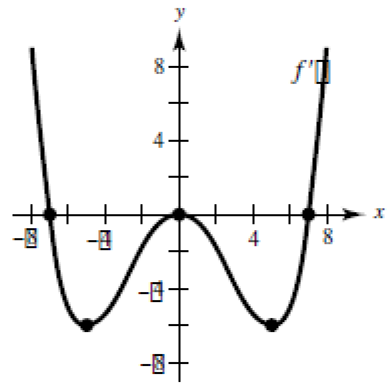
3.6 Relate f, f' and f'' and curve sketching
OBJ: Analyze and sketch the graph of a function; Relate f, f' and f''

Ex. 1 Consider the graph of f'(x) on the interval (-9,9). Justify all answers.



a. For what values of x does f(x) have a relative min?

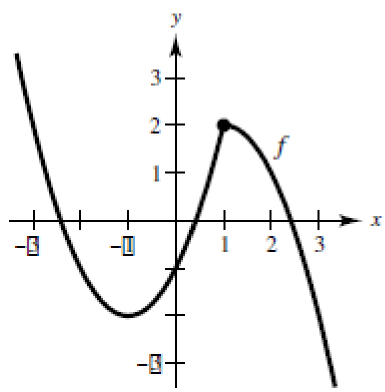
b. For what values of x does f(x) have a relative max?

c. Determine the open intervals where f(x) is concave down.

d. Determine the open intervals where f(x) is concave up.

Sketch the graph of f(x) if f(0)=0.

Ex 2. The graph of f(x) is shown below.



a. Estimate f'(0).

b. Determine the open intervals where f(x) is incresasing.

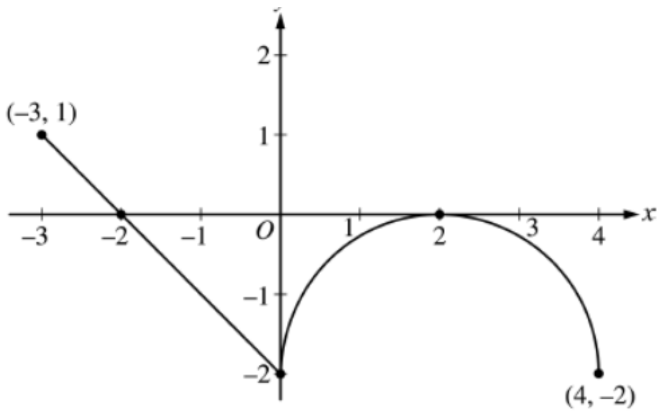
c. Determine the open intervals where f(x) is concave down.

d. What are the critical numbers of f(x)?

Sketch the graph of f'(x).

You try. (from the AP)

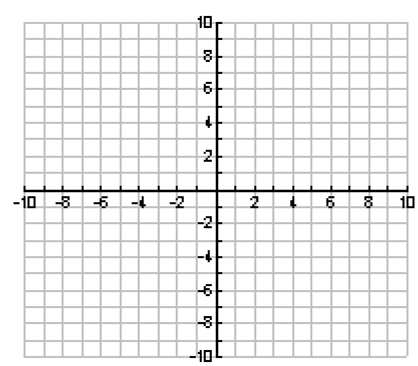
Using the graph of f '(x)



Graph of f'

4. Let f be a function defined on the closed interval $-3 \le x \le 4$ with $f(0) = 3$. The graph of f', the derivative of f, consists of one line segment and a semicircle, as shown above.
   (a) On what intervals, if any, is f increasing? Justify your answer.
   (b) Find the x-coordinate of each point of inflection of the graph of f on the open interval $-3 < x < 4$. Justify your answer.
   (c) Find an equation for the line tangent to the graph of f at the point $(0, 3)$.

Analyze and sketch the graph of $f(x) = \dfrac{x^2 - 2x + 4}{x - 2}$



Find

Intercepts

Asymptotes

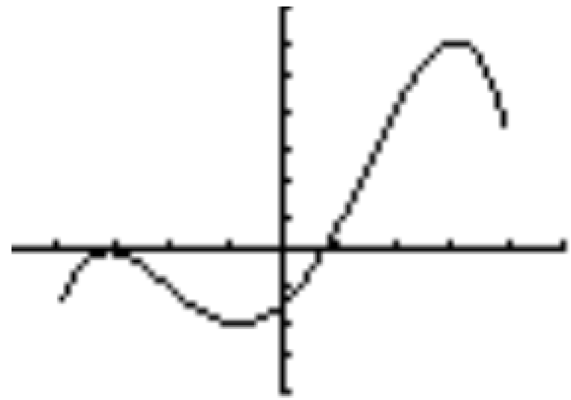
Increasing/decreasing

Concavity

Max/min

POI

Ex 3. The graph of f '(x) is shown.
a. Suppose f(3)=1. Find the equation of the line tangent to f at (3,1).

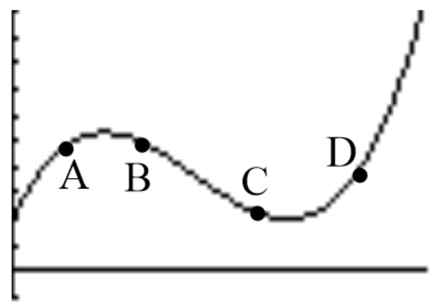


b. Where does f have a local minimum? Justify.

c. Estimate f "(3).

d. Where does f have an inflection point? Justify.

Ex 4.
At which point(s) is the first derivative of f positive?



At which point(s) is the second derivative of f positive?

Ex 5. Arrange these in order from least to greatest:

f(c) f '(c) f ''(c)