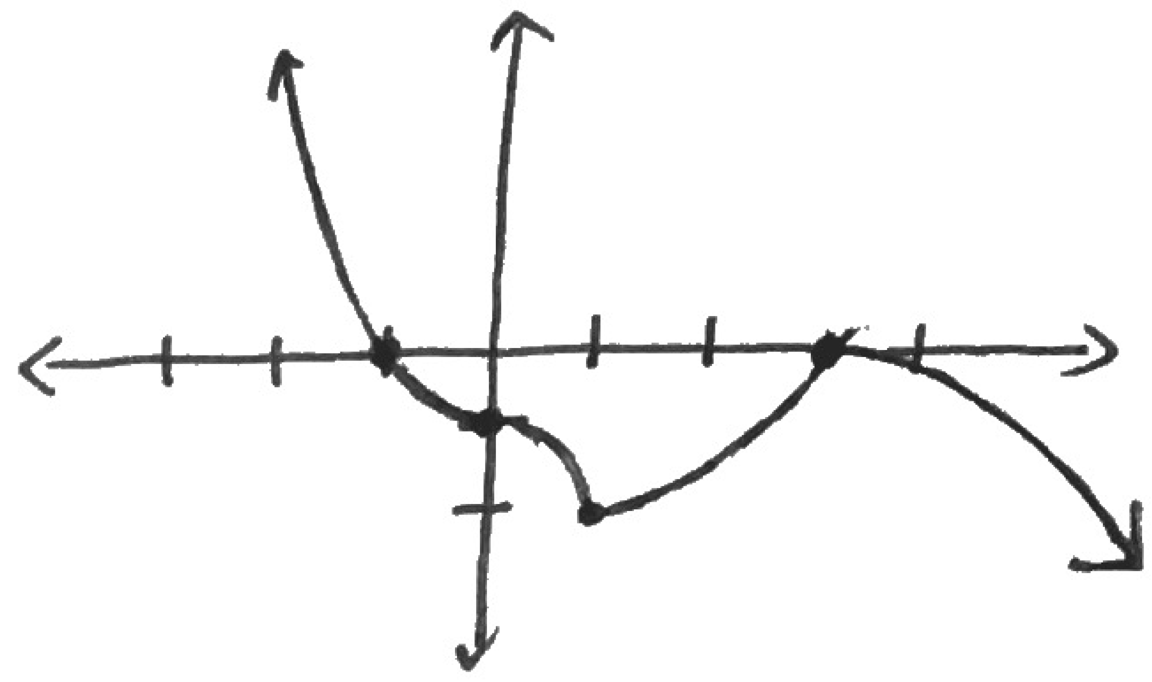
Unit 4 Derivative Graph Applications Review

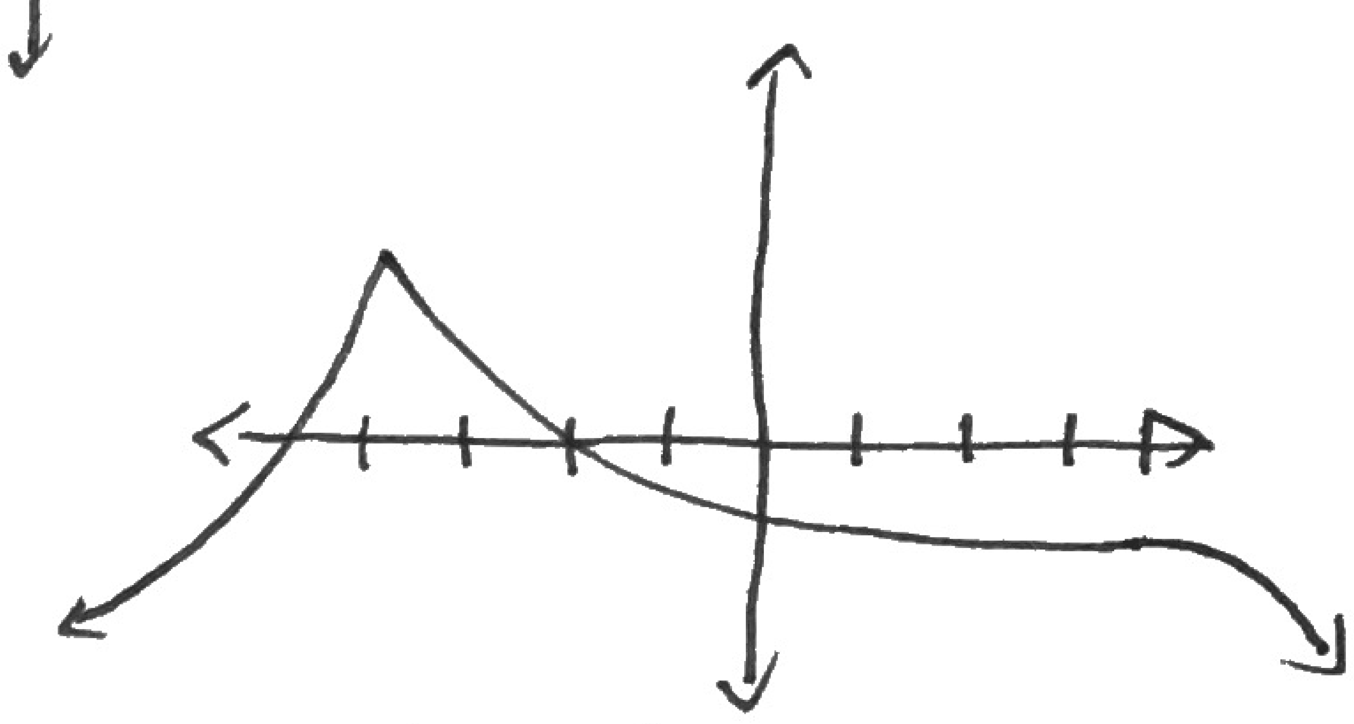
I. Use the following information about the continuous function f to sketch a possible graph for f.

1. $f'(x) > 0$ on $(1, 3)$ inc
   $f'(x) < 0$ on $(-\infty, 1)$ or $(3, \infty)$ dec
   $f''(x) > 0$ on $(-\infty, 0)$ or $(1, 3)$ CU
   $f''(x) < 0$ on $(0, 1)$ or $(3, \infty)$ CD
   $f(3) = 0$, $f(1) = -2$, $f(0) = -1$, $f(-1) = 0$

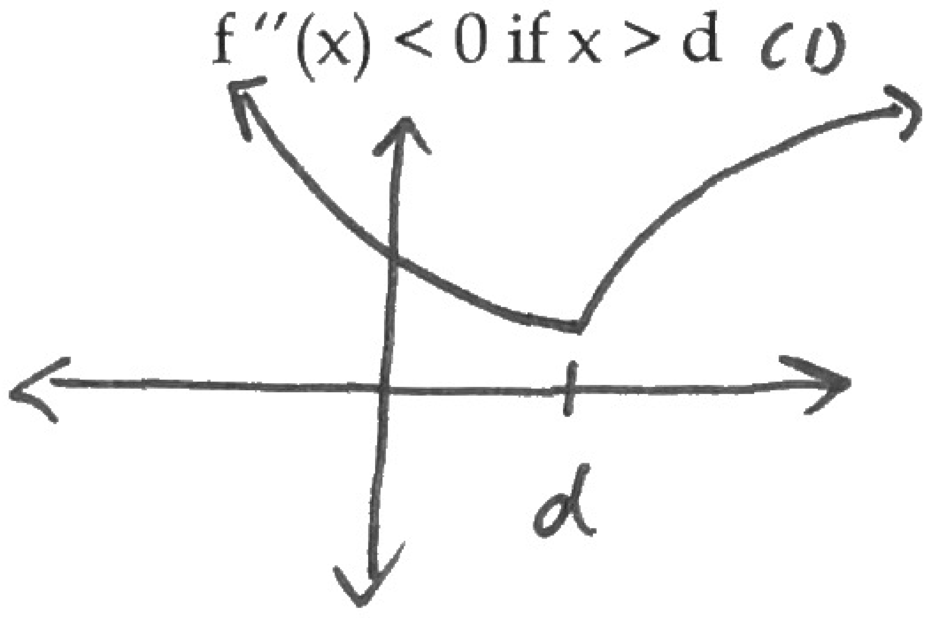


2.

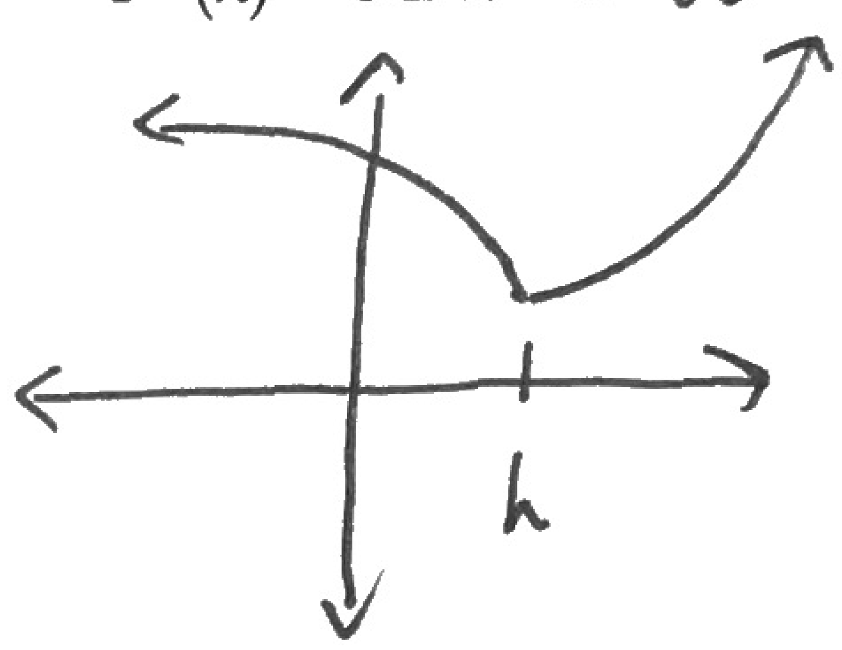
x	x < -4	-4	-4 < x < 4	4	x > 4
f '(x)	positive	DNE	negative	0	negative
f ''(x)	positive	DNE	positive	0	negative



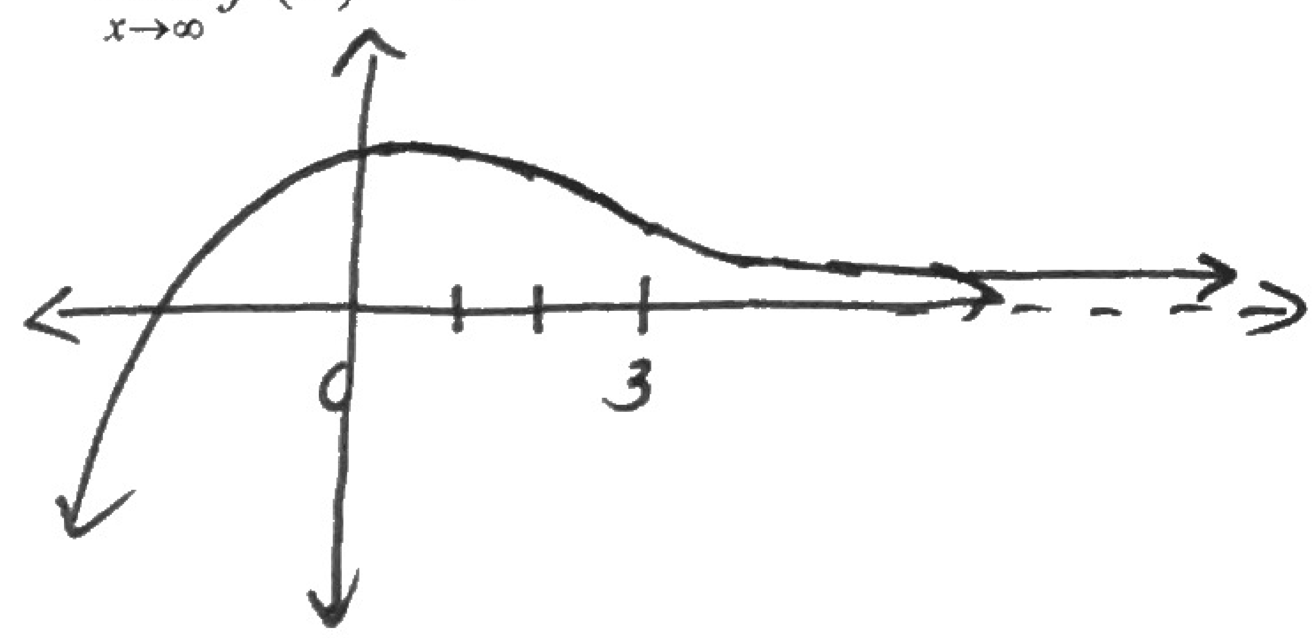
3. $f'(x) < 0$ if $x < d$ dec
   $f'(x) > 0$ if $x > d$ inc
   $f''(x) > 0$ if $x < d$ CU
   $f''(x) < 0$ if $x > d$ CD



4. $f'(h)$ DNE
   $f''(x) < 0$ if $x < h$ CD
   $f''(x) > 0$ if $x > h$ CU



5. $f'(x) > 0$ if $x < 0$ inc
   $f'(x) < 0$ if $x > 0$ dec
   $f''(x) = 0$ at $x = 3$ PPOI
   $\lim_{x\to\infty} f(x) = 0$



II. The figure below shows the graph of $g'(x)$, the derivative of a function g with domain [-3, 4].

a) Determine the values of x for which g has a local minimum, and a local maximum. Justify.
   L. Min x = -2, 2 b/c g' changes from - to + L. Max x = 0 g' changes from + to -

b) Determine the values of x for which g is concave down, and concave up. Justify.
   CU (-3, -1) (1, 3) b/c slope of g' is + CD (-1, 1) (3, 4) b/c slope of g' is -

c) Based on the information given and the fact that $g(-3) = 3$ and $g(4) = 6$, sketch a graph for g.