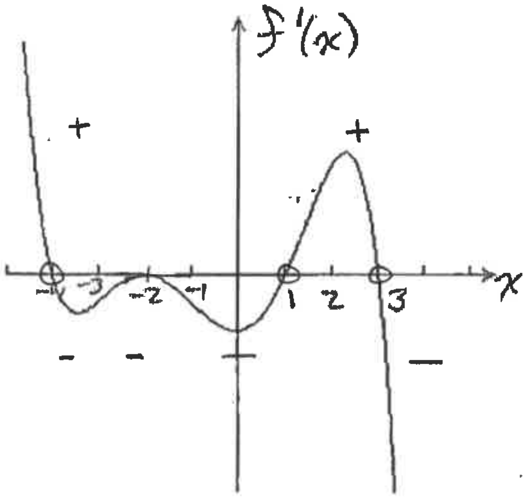
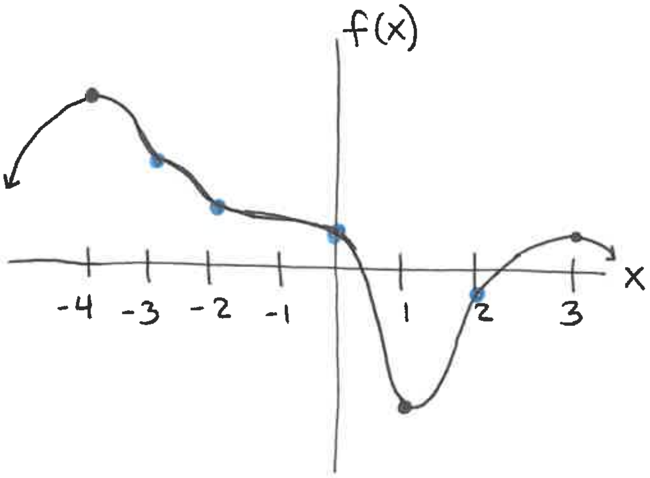
Calculus
5.1-5.3 Review

1. Below is the graph of the derivative of the function f. Draw a possible graph of the function f.





extrema max : x = -4, 3
min : x = 1

poi : x = -3, -2, 0, 2

2. For the functions below find:
   a. Critical points and determine which points are critical points only rather than stationary.
   b. Find the intervals on which f is increasing and decreasing.
   c. Find the coordinates of all local extrema.
   d. Find the intervals on which the function is concave up and concave down.
   e. Find the coordinates of any points of inflection.

$f(x) = x^3 - 2x^2 - 2$

a) $f'(x) = 3x^2 - 4x$

$0 = 3x^2 - 4x$

$0 = x(3x - 4)$

$x = 0, \ 4/3$

both c.p & stationary

b) ↗ + ↘ − ↗ + f'

0 $\frac{4}{3}$

increasing $(-\infty, 0)$ and $(4/3, \infty)$

decreasing $(0, 4/3)$

c) max at $(0, -2)$

min at $(4/3, -86/27)$

d) $f''(x) = 6x - 4$

$0 = 6x - 4$

$\frac{4}{6} = \frac{2}{3} = x$

− + f''

$\frac{2}{3}$

concave up $(2/3, \infty)$

concave down $(-\infty, 2/3)$

e) poi

$(2/3, -70/27)$

AB Calculus
5.1-5.3 Review

$f(x) = \frac{1}{x-3}$

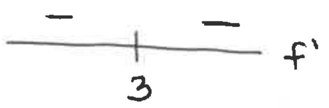
a) $f'(x) = -(x-3)^{-2}(1)$

$= -\frac{1}{(x-3)^2}$

$0 = -\frac{1}{(x-3)^2}$

c.p. $x = 3$
not a stationary pt

b)

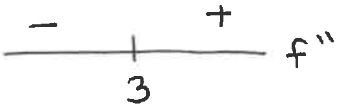


dec $(-\infty, 3) \cup (3, \infty)$

c) no extrema

d) $f''(x) = 2(x-3)^{-3}$

$= \frac{2}{(x-3)^3}$



concave down $(-\infty, 3)$
concave up $(3, \infty)$

e) no poi

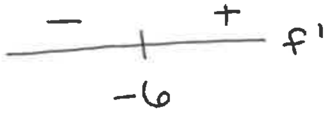
$f(x) = (5x + 30)^{\frac{2}{3}}$

a) $f'(x) = \frac{2}{3}(5x+30)^{-1/3}$

$0 = \frac{2}{3(5x+30)^{1/3}}$

c.p. $x = -6$
not a stationary pt

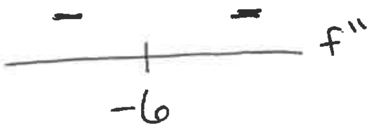
b)



increasing $(-6, \infty)$
decreasing $(-\infty, -6)$

c) min at
$(-6, 0)$

d) $f''(x) = -\frac{2}{9}(5x+30)^{-4/3}$



concave down $(-\infty, -6) \cup (-6, \infty)$

e) no poi

concave down

3. Sketch a continuous curve $y = f(x)$ where $f(1) = 0$ ✓, $f'(0) = 0$, $f'(2) = 0$, $f''(x) < 0$ for $x < 1$, and $f''(x) > 0$, for $x > 1$.

concave up

c.p.
slope is 0
at x=0

c.p
slope 0
at x=2