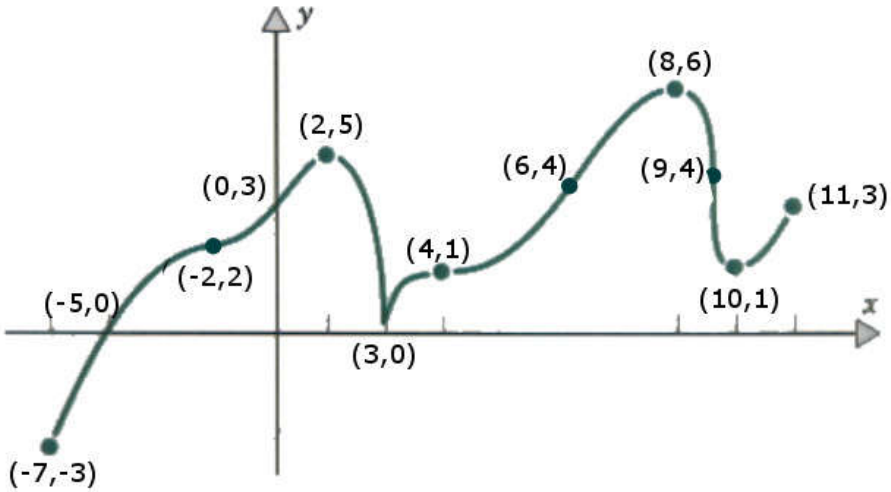
Honors Brief Calculus **Name:** _____
Curve Sketching Homework (Mr. Felling's classes)

Day 1…

#1) Add slope and concavity maps



'Add Slope' map:

'Add Concavity' map:

a) What is the domain of f?

b) List the intercepts of f?

c) On what intervals, if any, is the graph of f increasing?

d) On what intervals, if any, is the graph of f decreasing?

e) For what x-values does $f'(x) = 0$?

f) For what x-values does $f'(x)$ not exist?

g) List the point(s) at which f has a local maximum.

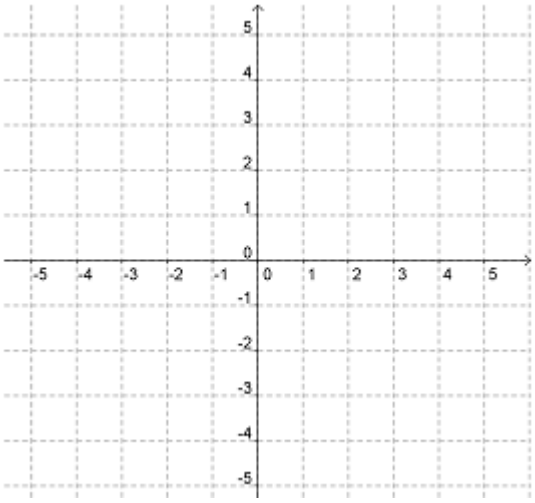
h) List the point(s) at which f has a local minimum.

i) On what x-intervals is the graph of f concave up?

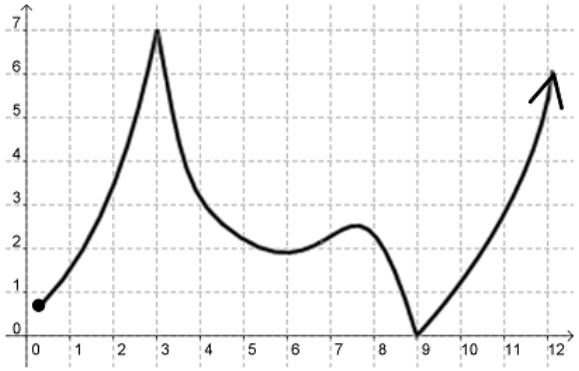
j) On what x-intervals is the graph of f concave down?

#2. Given the following info, add slope and concavity maps below and sketch the function curve:

intercepts at (-4,0) (2,0) (0,-1)
local max at (1,2)
local min at (-2,-3)
inflection point at (0,-1)
increasing: (-2,1)
decreasing: $(-\infty,-2) \cup (1,\infty)$
concave up: $(-\infty,0)$
concave down: $(0,\infty)$

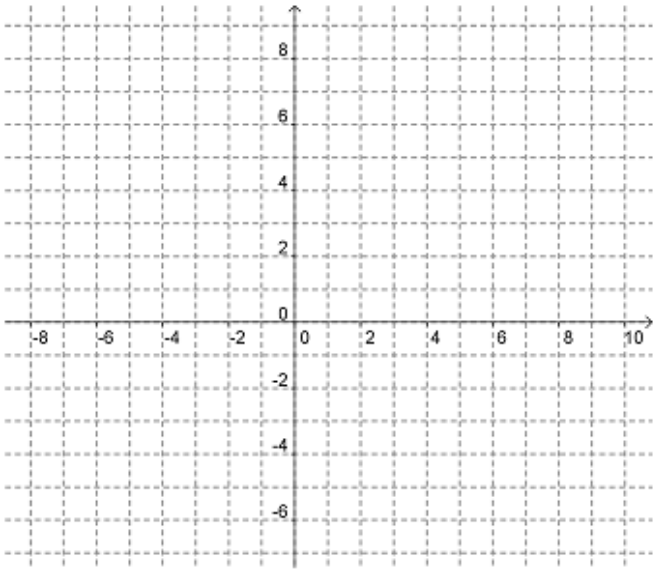


#3. For function below find the following: all critical points, local maxima and minima, inflections points, and x-intervals where the function is increasing, decreasing, concave up, and concave down.



#4. Given the following info, add slope and concavity maps below and sketch the function curve:

intercept: (0,4) (2,0) (8,0) (-6,0)
local max: (-2,6) (6,5)
local min: (3,-4)
inflection point: (0,4) (1,2) (2,0) (4,0)
increasing: $(-\infty,-2)\cup(3,6)$
decreasing: $(-2,3)\cup(6,\infty)$
concave up: $(0,1)\cup(2,4)$
concave down: $(-\infty,0)\cup(1,2)\cup(4,\infty)$



Day 2…

#4. (Without a calculator) using the precalc, first derivative, second derivative curve sketching procedure, sketch the graph of $f(x) = -x^2 + 6x + 7$.

#5. (Without a calculator) using the precalc, first derivative, second derivative curve sketching procedure, sketch the graph of $f(x) = x^3 - 9x^2 + 27x - 27$.

#6. (Without a calculator) using the precalc, first derivative, second derivative curve sketching procedure, sketch the graph of $f(x) = -x^3 + 3x - 1$.

#7. (Without a calculator) using the precalc, first derivative, second derivative curve sketching procedure, sketch the graph of $f(x) = x^6 - 3x^5$.

Day 3…

#8. At a toy store the revenue *R*, in dollars, derived from selling *x* electric trucks is
$R(x) = -0.005x^2 + 20x$.

(a) Determine where the graph of R is increasing and where it is decreasing.
(b) How many trucks need to be sold to maximize revenue?
(c) What is the maximum revenue?
(d) Sketch the function *R* (without using a calculator).

#9. Find the local maxima and local minima of the function $f(x) = x^3 - 3x + 2$ without sketching the function (using only the first and second derivatives).

#10. For a certain production facility the cost function is $C(x) = 2x + 5$ and the revenue function is $R(x) = 8x - x^2$ where *x* is the number of units produced (in thousands) and *R* and *C* are measured in millions of dollars.

(a) Find the profit function $P(x) = R(x) - C(x)$.
(b) Where is the profit a maximum?
(c) What is the maximum profit?
(d) Where is the revenue a maximum?
(e) What is the maximum revenue?

#11. Locate all horizontal and vertical asymptotes, if any, of the function $f(x) = \dfrac{x^2}{x^2 - 4}$.

#12. (Without a calculator) using the precalc, first derivative, second derivative procedure curve sketching procedure (including finding any asymptotes), sketch the graph of $f(x) = \dfrac{8}{x^2 - 16}$.