

Practice curve sketching, to do this over Fall Break and submit Monday Oct 18

1. Suppose  $f(x) = x^4 + \frac{44}{3}x^3 - 84x^2$

a) Find the intervals where  $f$  is increasing and where  $f$  is decreasing. Write answers using interval notation.

$f$  is increasing on:

$f$  is decreasing on:

b) Use the First Derivative Test to determine the location of all local extrema of  $f$ . Finding just the  $x$ -coordinate is fine. For each extremum, categorize it as a maximum or a minimum.

2. Suppose  $g(x) = x^2 - 8 \ln x$

a) Find the local extrema of  $g$  using the Second Derivative Test.

b) Based on  $g''$ , explain why  $g$  does not have any inflection points.

3. Suppose  $h$  is a function having second derivative  $h''(x) = (x + 4)^2(x - 3)(x + 1)$ . At what values of  $x$ , if any, does  $h$  have inflection points? Justify your answer.

4. Suppose  $g(x) = \frac{2x^2 - 9x - 5}{3x^2 - 3x - 60}$

a) Find  $\lim_{x \rightarrow \infty} g(x)$ . (Show appropriate work.)

b) What is the equation of the horizontal asymptote to the graph of  $g$ ?

c) Use appropriate limits to find the equation(s) of any vertical asymptotes to the graph of  $g$ .