



MATH 151- WEEK-IN-REVIEW 8

ALEXANDRA L. FORAN

WHAT DOES THE DERIVATIVE TELL US?

1. Find the absolute maximum and minimum values of each of the following functions on the given interval.

(a) $y = \frac{1}{x}$ on $[1, 5]$

(b) $f(x) = -5x^3$ on $[-2, 4]$



$$(c) g(x) = \begin{cases} x + 5 & -4 < x \leq -1 \\ 3 - x^2 & -1 < x < 3 \\ 5 - x & 3 \leq x < 4 \end{cases}$$

$$(d) h(x) = x^2 e^{-x} \text{ on } [0, 4]$$



2. Find the critical values of the following functions.

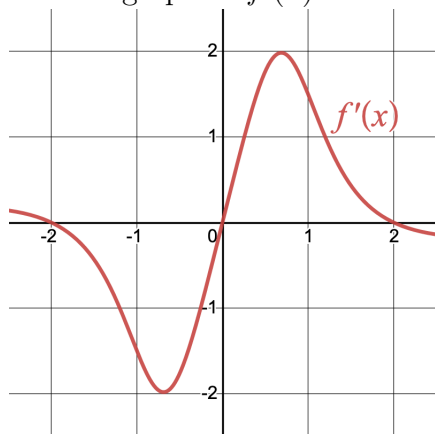
(a) $f(x) = \frac{7-x}{x+1}$

(b) $g(x) = (x^3 - 12x)^{1/3}$

3. Classify the local extrema of $f(x)$ given $f'(x) = (x-3)^5(x+1)(x+7)^8$.



4. Given the graph of $f'(x)$ below find the given intervals/values.



(a) Intervals where $f(x)$ is increasing

(b) Intervals where $f(x)$ is decreasing

(c) x -values of any local maxima

(d) x -values of any local minima

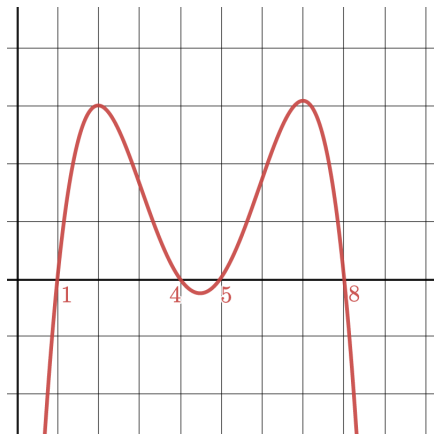
(e) Intervals where $f(x)$ is concave up

(f) Intervals where $f(x)$ is concave down

(g) x -values of any points of inflection



5. Give the x -value of the inflection points of f for each part.

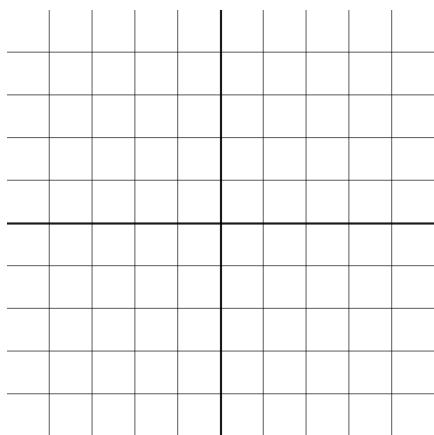


(a) The above curve is the graph of f .

(b) The above curve is the graph of f' .

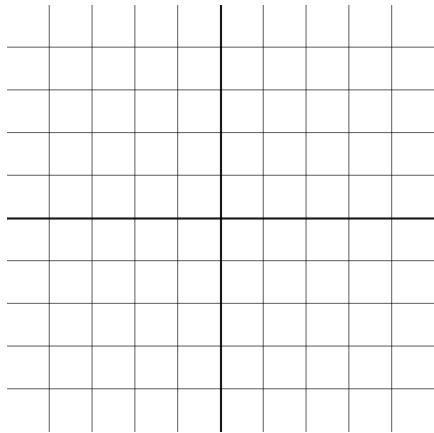
(c) The above curve is the graph of f'' .

6. Sketch a graph of a continuous function where $x = -1$ is a critical number, but the function has no local extrema.





7. Sketch a graph of a continuous function where $x = -1$ is a local minimum and the function is not differentiable at $x = 3$.



8. If $f'(x) = x(4x - 1)^{2/3}$, find where the function is concave up. Are there any points of inflection?

9. If $f(x) = x^2 \ln\left(\frac{x}{4}\right)$, find where the function is concave up. Are there any points of inflection?