Rutgers University
Math 151

Sections 4.4: Concavity and Curve Sketching - Worksheet

1. Find the intervals where the functions below are concave up, concave down and find the inflection points.

   (a) $f(x) = \dfrac{1}{x^2 + 12}$

   (b) $f(x) = x^4 e^{-3x}$

2. Sketch the graphs of the following functions. Your graph should clearly show any asymptotes, local extrema and inflection points of the functions.

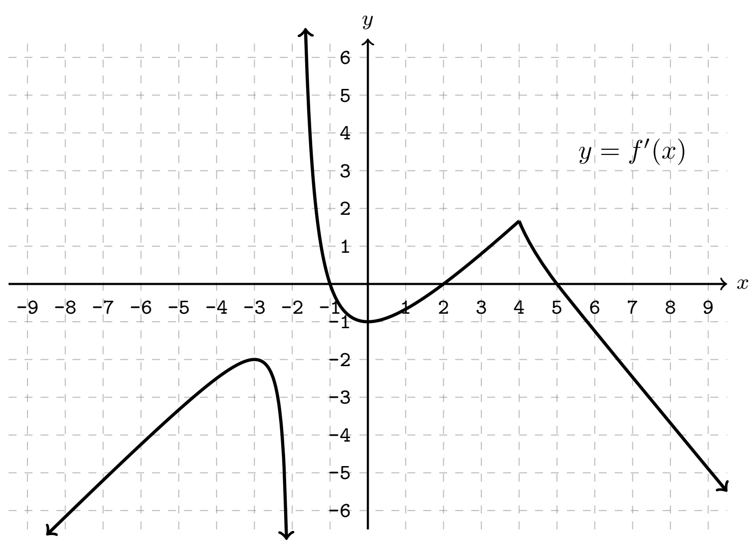
   (a) $f(x) = \frac{8}{x} - x^2$

   (b) $f(x) = \tan(2x) - 8x$ on $\left(-\frac{\pi}{4}, \frac{\pi}{4}\right)$

3. Suppose that f is continuous on $(-\infty, \infty)$, that $f'(x) = \dfrac{x}{(x+4)^{1/3}}$ and that $f''(x) = \dfrac{2x+12}{3(x+4)^{4/3}}$.

   (a) Find the critical points of f.
   (b) Find the intervals where f is increasing and the intervals where f is decreasing.
   (c) Find the location of the local extrema of f.
   (d) Find the intervals where f is concave up and the intervals where f is concave down.
   (e) Find the x-coordinates of the inflection points of f.

4. Suppose that f is a differentiable function. The graph of the **derivative** of f, $y = f'(x)$, is sketched below.



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