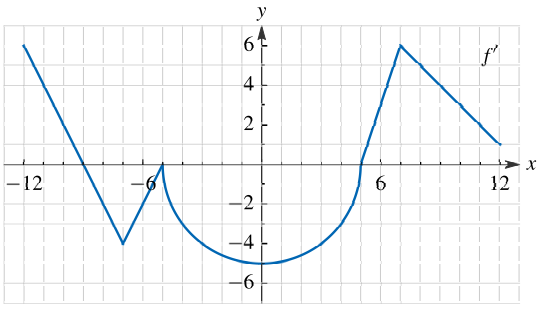
Monday Night Calculus

Function Analysis using Graphical Stems

11/9 Question

The graph of f', the derivative of a differentiable function f, is shown for $-12 \leq x \leq 12$. The graph consists of four line segments and a semicircle.



1. **(a)** Find all values of x in the interval $-12 < x < 12$, if any, at which f has a critical point. Classify each critical point as the location of a relative minimum, relative maximum, or neither, Justify your answers.

(b) Find the values of x in the interval $-12 < x < 12$ at which f has an inflection point. Explain your reasoning.

(c) For $-12 < x < 12$, find the open intervals on which f is decreasing and concave up. Explain your reasoning.

(d) For $-12 < x < 12$, find the open intervals on which f is increasing and concave down. Explain your reasoning.

2. **(a)** It is known that $f(4) = -6$. Find an equation of the line tangent to the graph of f at $x = 4$.

(b) Find $f''(4)$.

3. Let g be the function defined by $g(x) = f''(x)$. Sketch a graph of g over the open interval $-12 < x < 12$.

4. **(a)** Find a positive value a such that $f'(a) = f''(a)$. For this value of a, find $f'''(a)$.

(b) Is there a negative value x such that $f'(x) = f''(x)$? Explain why or why not.