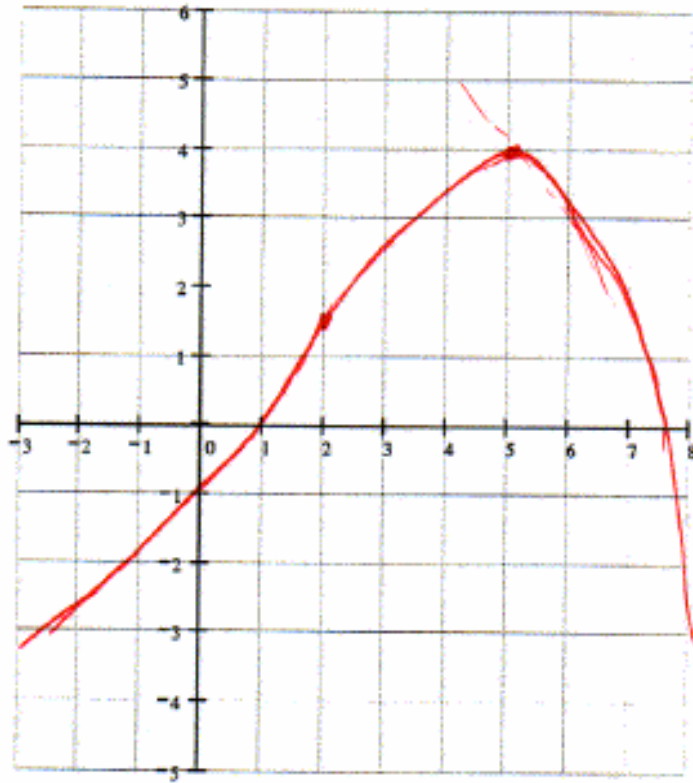


- (3.) (6 pts) (a) On the axes below, sketch a graph of a single *differentiable* function, $y = f(x)$, which has *all* of the following features:

- $f(5) = 4 \rightarrow (5, 4)$
- $f'(5) = -1$
- $f'(x) > 0$ for all $x < 4$
- $f''(x) > 0$ for all $x < 2$
- $f''(x) < 0$ for all $x > 2$
- $f'(x) < 0$ for all $x > 4$

increasing
conc. up
conc. down
decreasing



- (b) (4 pts) Using the given information, find an equation of the line tangent to the graph of f at $x = 5$.

Given point (5, 4), slope = -1

$$y - 4 = -1(x - 5) = -x + 5$$

$$y = -x + 9$$

- (c) (2 pts) Use your answer from part (b) to approximate $f(6)$.

$$f(6) \approx -6 + 9 = 3$$

- (d) (3 pts) From the *given* conditions (i.e., not just from your graph), should the approximation in part (c) be an overestimate or an underestimate? Explain--using a complete sentence.

Since f is concave down at $x = 6$, the approximation should be an overestimate.