1. (2 points each) For each of the following, circle all statements which **MUST** be true.

(a) Let \( f \) be a non-decreasing differentiable function defined for all \( x \).

- \( f'(x) \geq 0 \) for all \( x \).
- \( f''(x) \geq 0 \) for all \( x \).
- \( f(x) = 0 \) for some \( x \).

(b) Let \( f \) and \( g \) be continuous at \( x = -1 \), with \( f(-1) = 0 \) and \( g(-1) = 3 \).

- \( f \cdot g \) is continuous at \( x = -1 \).
- \( \frac{g}{f} \) is continuous at \( x = -1 \).
- \( \frac{f}{g} \) is continuous at \( x = -1 \).

(c) Let \( f \) be differentiable at \( x = 2 \), with \( f(2) = 17 \).

- \( \lim_{x \to 2} f(x) = 17 \).
- \( \lim_{h \to 0} \frac{f(2+h) - f(2)}{h} = 17 \).
- \( \lim_{h \to 0} \frac{f(2+h) - f(2)}{h} \) exists.

(d) Let \( f \) be defined on \([a, b]\) and differentiable on \((a, b)\), with \( f'(x) < 0 \) for all \( x \) in \((a, b)\).

- If \( a < c < d < b \), then \( f(c) > f(d) \).
- \( f''(x) > 0 \) for some \( x \) in \((a, b)\).
- \( f \) is continuous on \((a, b)\).

(e) Let \( f \) be a twice-differentiable function that is concave-up on \((a, b)\), with \( f(a) = 4 \) and \( f(b) = 1 \).

- For some \( x \) in \((a, b)\), \( f(x) = 2.5 \).
- For all \( x \) in \((a, b)\), \( f''(x) \geq 0 \).
- \( f'(a) \leq f'(b) \).