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), $f''(x) \geq 0$.
- $f'(a) \leq f'(b)$.