

1. [12 points] For each problem below, circle all of the statements that MUST be true. (The three parts (a)–(c) are independent of each other. No explanations are necessary.)

a. [5 points] Suppose f is an increasing differentiable function with domain $(-\infty, \infty)$ so that $f(1) = 1$ and $f(-1) = -1$.

- f is linear.
- There is a number c so that $f(c) = 0$.
- $\lim_{x \rightarrow 1} f(x) = 1$
- $\lim_{x \rightarrow \infty} f(x) = \infty$
- $f'(1) \geq 0$

b. [3 points] Suppose $g(t)$ is the mass (in grams) of mold on a wedge of cheese in a refrigerator t days after it was abandoned. This mass grows exponentially as a function of time for two weeks, when it is finally thrown away.

- The graph of g is concave up.
- The continuous growth rate of g is less than the daily growth rate.
- The amount of time it takes for the mass of mold on the cheese to triple is 1.5 times the amount of time it takes for it to double.

c. [4 points] If $f(x) = \frac{g(x)}{h(x)}$ and $h(3) = 0$ then

- The graph of f has a vertical asymptote at $x = 3$.
- 3 is not in the domain of f .
- f is not continuous on $[-2, 2]$.
- $\lim_{x \rightarrow 3} f(x)$ does not exist.