5. **True/False/Explain** (40 points) For each of the following determine whether the statements are true or false. To receive credit you must justify your decision with a relevant sentence or two, calculation or picture explaining your thoughts.

a. Suppose that a function $h$ and its derivative $h'$ are continuous. If $h'(x) < 0$ for all $a \leq x \leq b$ then every left-hand sum estimate of $\int_a^b h(x) \, dx$ will be an overestimate.

b. If $f(x)$ is continuous on $[-5,5]$, then $\int_0^2 |f(x)| \, dx \leq \int_0^3 |f(x)| \, dx$

c. If $f(x)$ is a positive, continuous function for $x \geq 0$, and if $\lim_{x \to \infty} f(x) = 0$, then $\int_1^\infty f(x) \, dx$ converges.

d. If $F(x)$ and $G(x)$ are anti-derivatives of a function $f(x)$ that is continuous on $(-\infty, \infty)$, and if $F(5) > G(5)$, then $F(10) > G(10)$. 