9. [10 points] For each of the statements below, circle TRUE if the statement is always true and circle FALSE otherwise. The letters a, b and c below represent real number constants. Any ambiguous marks will be marked as incorrect. No partial credit will be given on this problem.

a. [2 points] Let $f(x)$ and $g(x)$ be continuous functions which are defined for all real numbers. If $f(x) \geq g(x)$ for all real numbers x, then $\int_a^b f(x)\, dx \geq \int_a^b g(x)\, dx$ whenever $a < b$.

True False

b. [2 points] If a is a positive, then the function $h(x) = \frac{\ln(ax^2)+x}{x}$ is an antiderivative of $j(x) = \frac{2-\ln(ax^2)}{x^2}$.

True False

c. [2 points] Suppose a differentiable function $\ell(x)$ is concave down and defined for all real numbers. If $a < b$, then

$$\frac{\ell(b) - \ell(a)}{b - a} < \ell'(b).$$

True False

d. [2 points] If $x = a$ is a critical point of a function $m(x)$, then $m'(a) = 0$.

True False

e. [2 points] If $n(x)$ and $p(x)$ are continuous functions which are defined for all real numbers, then

$$\int_a^b (c\,n(x) - p(x))\, dx = c\int_a^b n(x)\, dx + \int_b^a p(x)\, dx$$

True False