1. (2 points each) Circle "True" or "False" for each of the following problems. Circle "True" only is the statement is *always* true. No explanation is necessary.

(a) Suppose f is a continuous function such that $f(1) = 5$ and $f'(x) < 0$ for $x \geq 5$. Then there is an $x > 5$ so that $f(x) = 0$.

True False

(b) $\int_0^{10} f(x)dx$ is a function of x.

True False

(c) Let

$$f(x) = \begin{cases} 5 & 0 \leq x < 2 \\ 0 & 2 \leq x < 8 \\ 10 & 8 \leq x \leq 10. \end{cases}$$

Then the average value of $f(x)$ on $[0, 10]$ is 3.

True False

(d) If f' is continuous and has a local maximum at a, then f has an inflection point at a.

True False

(e) $\int x \ln(x)dx = \frac{x^2}{2}\ln(x) - \frac{x^2}{4} + C$

True False

(f) A function can have more than one antiderivative.

True False

(g) For a continuous function f, either the left-hand sum or the right-hand sum is an overestimate of the definite integral of f on an interval $[a, b]$.

True False