

1. (2 points each) Circle “True” or “False” for each of the following problems. Circle “True” only if 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  $[a, b]$ .