10. [12 points] For the following questions, determine if the statement is ALWAYS true, SOMETIMES true, or NEVER true, and circle the corresponding answer. Justification is not required.

a. [2 points] Suppose $H(x)$ is a continuous function such that $H'(x) > 0$ and $H(x) \geq 0$ for all x. Then $H(x)$ is a cumulative distribution function (cdf).

Circle one: **ALWAYS** **SOMETIMES** **NEVER**

b. [2 points] If a_n is a sequence of positive numbers, and the sequence $S_n = a_1 + \cdots + a_n$ converges to S, then a_n converges to S.

Circle one: **ALWAYS** **SOMETIMES** **NEVER**

c. [2 points] The average value of a continuous function $f(x)$ on the interval $[0, 1]$ is given by $\displaystyle\int_0^1 xf(x)\,\mathrm{d}x$.

Circle one: **ALWAYS** **SOMETIMES** **NEVER**

d. [2 points] $\displaystyle\int_2^3 \frac{1}{x\ln(x)}\,\mathrm{d}x = \int_2^3 \frac{1}{u}\,\mathrm{d}u$.

Circle one: **ALWAYS** **SOMETIMES** **NEVER**

e. [2 points] If n is a fixed number which is bigger than 100, and MID(n) and LEFT(n) both estimate $\displaystyle\int_0^{\pi/2} \cos(x)\,\mathrm{d}x$, then

$$\int_0^{\pi/2} \cos(x)\,\mathrm{d}x \leq \mathrm{MID}(n) \leq \mathrm{LEFT}(n).$$

Circle one: **ALWAYS** **SOMETIMES** **NEVER**

f. [2 points] If $r = f(\theta)$ is a polar curve, then the arclength of the part of the curve in the first quadrant is given by $\displaystyle\int_0^{\pi/2} \sqrt{(f(\theta))^2 + (f'(\theta))^2}\,\mathrm{d}\theta$.

Circle one: **ALWAYS** **SOMETIMES** **NEVER**