10. [10 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 that $f(x)$ is a continuous function with a continuous antiderivative $F(x)$ which satisfies $F(1) = 5$. Suppose that $\displaystyle\int_1^4 f(t)\ dt = 6$, and let $H(x) = \displaystyle\int_4^x f(t)\ dt$. Then $F(2026) - H(2026) = 11$.

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

b. [2 points] Suppose that $g(x)$ is a continuous function which is concave up on the interval $[2, 5]$, and that the TRAP(5) estimate to $\displaystyle\int_2^5 g(x)\ dx$ is 11. Then the average value of $g(x)$ on the interval $[2, 5]$ is at least 4.

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

c. [2 points] Suppose that k is an integer. Then the point $(x, y) = (-1, 0)$ in the xy-plane can be described as $(r, \theta) = (1, 2k\pi)$ in polar coordinates.

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

d. [2 points] Suppose that the series $\displaystyle\sum_{n=1}^{\infty} a_n$ converges. Then the power series $\displaystyle\sum_{n=1}^{\infty} a_n x^n$ converges for all x.

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

e. [2 points] Suppose k is a positive constant and that the improper integral $\displaystyle\int_e^{\infty} \frac{1}{x \ln(x)^k}\ dx$ converges. Then the series $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n^k}$ also converges.

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