

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] If $a(x)$ is a concave up differentiable function, and RIGHT(8) and TRAP(8) are used to estimate $\int_{-1}^1 a(x) dx$, then

$$\text{RIGHT}(8) < \text{TRAP}(8).$$

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

- b. [2 points] If $b(x)$ is an increasing, concave down differentiable function, and TRAP(10) and MID(10) are used to estimate $\int_{-1}^1 b(x) dx$, then

$$\text{MID}(10) < \int_{-1}^1 b(x) dx < \text{TRAP}(10).$$

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

- c. [2 points] Suppose that $f(x)$ is a decreasing differentiable function, and that LEFT(2) and LEFT(4) are used to estimate $\int_{-1}^1 f(x) dx$. Then

$$\int_{-1}^1 f(x) dx \leq \text{LEFT}(4) \leq \text{LEFT}(2).$$

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

- d. [2 points] Suppose that $g(x)$ is a continuous function with an antiderivative $G(x)$ which satisfies $G(3) = 5$. Suppose that $\int_3^7 g(t) dt = 4$, and let $H(x) = \int_7^x g(t) dt$. Then $G(50) - H(50) = 9$.

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

- e. [2 points] Suppose that $h(x)$ is a continuous odd function. Then

$$\int_{-1}^1 x^2 (h(x))^2 dx = 2 \int_0^1 x^2 (h(x))^2 dx.$$

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