9. [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 $f(x)$ is an increasing, differentiable function, and RIGHT(4) is used to estimate $\int_{-2}^{2} f(x)\ dx$, then

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

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

b. [2 points] Suppose that $g(x)$ is a concave down, differentiable function, and TRAP(4) is used to estimate $\int_{0}^{4} g(x)\ dx$. Then

$$\text{TRAP}(4) \geq \int_{0}^{4} g(x)\ dx.$$

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

c. [2 points] Suppose $h(x)$ is a concave down, even differentiable function and $a < 0 < b$ are constants. If RIGHT(4) and LEFT(4) are used to estimate $\int_{a}^{b} h(x)\ dx$, then

$$\text{RIGHT}(4) = \text{LEFT}(4).$$

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

d. [2 points] If $D(x)$ is an increasing, concave up differentiable function, and TRAP(8) and RIGHT(4) are used to estimate $\int_{-2}^{2} D(x)\ dx$, then

$$\int_{-2}^{2} D(x)\ dx < \text{TRAP}(8) < \text{RIGHT}(4).$$

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

e. [2 points] Suppose that $E(x)$ is a positive, increasing differentiable function, and that LEFT(4) and MID(2) are used to estimate $\int_{-2}^{2} E(x)\ dx$. Then

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

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