

3. [12 points] In each part of this problem, circle all options which make the statement **always true**. There may be more than one correct answer for each part. If none of the options make the statement always true, then circle NONE OF THESE. You must circle your answers entirely to receive credit on this problem.

- a. [3 points] If  $f(x)$  and  $g(x)$  are differentiable functions satisfying  $f(0) = 0$  and  $f'(x) = g(x)$ , then

$$g(0) = 0.$$

$$\pi + f(x) \text{ is an antiderivative of } g(x).$$

$$\int_0^1 g(x) dx = f(1).$$

$$2^e + g(x) \text{ is an antiderivative of } f(x).$$

NONE OF THESE

- b. [3 points] Suppose  $a < b$ , and that  $p(x)$  and  $r(x)$  are continuous functions on  $[a, b]$ . If  $\int_a^b p(x) dx < \int_a^b r(x) dx$  then

$$p(x) < r(x) \text{ for all } x \text{ in the interval } [a, b].$$

$$p(a) < r(a).$$

$$p(x) > r(x) \text{ for at least one value } x \text{ in } [a, b].$$

$$p(0) = 0.$$

NONE OF THESE

- c. [3 points] Suppose  $k(t)$  is a continuous function with  $k(t) < 0$  for all  $t$ , If  $M(w) = \int_0^{-w^2} k(t) dt$  then

$$M(w) \text{ is increasing for } w > 0.$$

$$M(0) = 0.$$

$$M(w) \text{ is increasing for } w < 0.$$

$$M(w) \text{ is decreasing for } w < 0.$$

NONE OF THESE

- d. [3 points] If  $h(x) = x^2 + x + 1$ , consider the integral  $I = \int_0^{10} h(x) dx$ . The integral  $I$  is

$$\text{larger than MID}(5).$$

$$\text{larger than TRAP}(5).$$

$$\text{larger than LEFT}(5).$$

$$\text{larger than RIGHT}(5).$$

NONE OF THESE