

1. (2 points each) Circle “True” or “False” for each of the following problems. Circle “True” only if the statement is *always* true. No explanation is necessary.

- (a) Suppose that a differentiable function  $h$  and its derivative,  $h'$ , are continuous. If  $h'(x) < 0$  for all  $a \leq x \leq b$  then every left-hand sum estimate of  $\int_a^b h(x)dx$  will be an overestimate.

True                  False

- (b) For  $f(x)$  a continuous function,  $\int_{-1}^1 f(x)dx = 2 \int_0^1 f(x)dx$ .

True                  False

- (c) If  $\int_0^3 f(x)dx = 5$ , then  $\int_0^3 3f(x)dx = 15$ .

True                  False

- (d) If  $Z(t)$  is an anti-derivative for  $z(t)$ , then  $Z(t + 5)$  is also an anti-derivative for  $z(t)$ .

True                  False

2. (3 points each) Explain in words what the following represent:

- (a)  $\int_2^6 f(t)dt$  where  $f(t)$  is the rate at which people are lining up outside of Target waiting for the store to open at 6 am, where  $t$  is in hours after midnight on the day after Thanksgiving,

- (b)  $\int_0^4 a(t)dt$  where  $a(t)$  is acceleration of an object in ft/sec<sup>2</sup> and  $t$  is in seconds

- (c)  $\frac{1}{4} \int_5^9 r(t)dt$  where  $r(t)$  is rainfall in inches per hour and  $t$  is in hours since noon