

WRITE YOUR NAME:

MAC 2312 Quiz 3  
Tuesday January 23rd

Evaluate the definite integral using any correct method.

$$\int_0^1 3(x+1)^2 dx$$

METHOD 1: Expand.  $\int_0^1 3(x^2 + 2x + 1) dx = 3 \int_0^1 (x^2 + 2x + 1) dx$   
 $= 3 \left[ \frac{x^3}{3} + x^2 + x \right]_0^1 = 3 \left( \frac{1}{3} + 1 + 1 \right) = 1 + 3 + 3 = \boxed{7}$

METHOD 2: Substitute  $u = x + 1 \Rightarrow du = 1 dx = dx$   $\left( \frac{du}{dx} = 1 \right)$   
If  $x = 0$  then  $u = 0 + 1 = 1$ . If  $x = 1$  then  $u = 1 + 1 = 2$ .

$$\int_{x=0}^{x=1} 3(x+1)^2 dx = \int_{u=1}^{u=2} 3u^2 du = \left[ u^3 \right]_{u=1}^{u=2}$$
$$= 2^3 - 1^3 = 8 - 1 = \boxed{7}$$