Substitions

1. Find the following anti-derivatives:

$$\int t \cos(t^2) \, dt \tag{1}$$

$$\int x^2 (x^3 - 3) \, dx \tag{2}$$

$$\int (x^2 + 3)^2 \, dx \tag{3}$$

$$\int \sqrt{\cos(3t)} \sin(3t) \, dt \tag{4}$$

$$\int \frac{1}{2x} \, dx \tag{5}$$

2. Find the following definite integrals:

$$\int_0^{\frac{1}{2}} \cos(\pi x) \, dx \tag{6}$$

$$\int_1^2 2x e^{x^2} \, dx \tag{7}$$

$$\int_0^2 \frac{x}{(1 + x^2)^2} \, dx \tag{8}$$