

INTEGRALS (Substitution)**Section 7.1**

Evaluate the following integrals exactly using the substitution method. In each problem you need to find (i) u , (ii) du , (iii) integral in terms of u , (iv) limits of integration in terms of u (for the definite integrals), and then (v) evaluate the integral. Use proper notation.

1.
$$\int_0^{\pi} \cos^2\left(\frac{\theta}{5}\right) \sin\left(\frac{\theta}{5}\right) d\theta$$

$u =$

$du =$

$\text{---} \leq u \leq \text{---}$

2.
$$\int (t+1)e^{5t+5} dt$$

$u =$

$du =$

3.
$$\int_0^1 \frac{1+e^{3x}}{e^{3x}+3x} dx$$

$u =$

$du =$

$\text{---} \leq u \leq \text{---}$

4.
$$\int \frac{\sin(\ln ax)}{x} dx, \text{ where } a > 0$$

$u =$

$du =$

5. If $\int \frac{dx}{1 + \cos x} = \tan\left(\frac{x}{2}\right) + c$, find $\int \frac{1}{3 + 3\cos\left(\frac{x}{4}\right)} dx$ exactly where c is a constant.

$$w =$$

$$dw =$$

6. If $\int_0^3 \frac{1}{1 + y^2} dy = k$, find $\int_0^1 \frac{1}{1 + 9x^2} dx$ in terms of k .

$$u =$$

$$du =$$

$$\underline{\hspace{2cm}} \leq u \leq \underline{\hspace{2cm}}$$

7. If $\int_0^\infty \frac{x}{e^x + 1} dx = \frac{\pi^2}{12}$, find $\int_0^\infty \frac{x}{e^{5x} + 1} dx$ exactly.

$$u =$$

$$du =$$

$$\underline{\hspace{2cm}} \leq u < \underline{\hspace{2cm}}$$