

**Section 2: Integration by substitution****Exercise level 1**

1. Using the substitution  $u = 2x + 3$ , find  $\int (2x + 3)^3 dx$ .

2. Evaluate  $\int_{-1}^1 (3 - 2x)^4 dx$ .

3. Evaluate  $\int_0^2 \sqrt{1 + 4x} dx$ .

4. Evaluate

(i)  $\int_1^2 \frac{1}{x} dx$       (ii)  $\int_{-3}^{-1} \frac{1}{x} dx$

5. Evaluate (i)  $\int_0^2 e^{3x} dx$

(ii)  $\int_0^{\pi/4} \cos 2x dx$

6. Show that  $\int_0^{\pi/4} (3 \cos x - \sin x) dx = 2\sqrt{2} - 1$ .

7. Use the substitution  $u = x^3 + 2$  to find  $\int x^2 (x^3 + 2)^3 dx$ .

8. Use the substitution  $u = x + x^2$  to find  $\int \frac{1 + 2x}{\sqrt{x + x^2}} dx$ .

9. Find

(i)  $\int 2 \sin^2 x dx$       (ii)  $\int 3 \cos^3 x dx$

(iii)  $\int 4 \tan x dx$

10. Find

(i)  $\int_0^{\pi/3} 2 \sin^3 x dx$       (ii)  $\int_0^{\pi/4} \cos^2 x dx$

(iii)  $\int_0^{\pi/4} \tan x dx$