

Calculus Worksheet #7 Unit 9 Selected Solutions

Integrate each of the following.

$$4. \int x\sqrt{2x+7} dx = \frac{1}{2} \int (v^2-7)(v)(v dv) =$$

$$\text{let } v = \sqrt{2x+7} = \frac{1}{2} \int (v^4 - 7v^2) dv$$

$$v^2 = 2x + 7 = \frac{1}{2} \left[\frac{1}{5} v^5 - \frac{7}{3} v^3 \right] + C$$

$$x = \frac{1}{2}(v^2 - 7) = \frac{1}{30} v^3(3v^2 - 35) + C$$

$$dx = v dv$$

$$= \frac{1}{30} (2x+7)^{\frac{3}{2}} [3(2x+7) - 35] + C$$

$$= \frac{1}{30} (2x+7)^{\frac{3}{2}} (6x-14) + C$$

$$5. \int \cos^2(3x) dx = \frac{1}{2} \int [1 + \cos(6x)] dx =$$

$$= \frac{1}{2} \int dx + \frac{1}{2} \int \cos(6x) dx$$

$$= \frac{1}{2} x + \frac{1}{12} \sin(6x) + C$$

$$8. \int \tan^2(4x) dx = \int [\sec^2(4x) - 1] dx =$$

$$= \int \sec^2(4x) dx - \int dx =$$

$$= \frac{1}{4} \tan(4x) - x + C$$

$$10. \int \frac{dx}{\sqrt{1-4x^2}} = \frac{1}{2} \int \frac{\cos \theta d\theta}{\cos \theta} = \frac{1}{2} \int d\theta = \frac{1}{2} \theta + C$$

$$\text{let } \theta = \sin^{-1}(2x)$$

$$x = \frac{1}{2} \sin \theta$$

$$\sqrt{1-4x^2} = \cos \theta$$

$$dx = \frac{1}{2} \cos \theta d\theta$$

$$= \frac{1}{2} \sin^{-1}(2x) + C$$