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A1

8.3

Q18

$$\begin{aligned} & \int 8 \cos^4 2x dx \\ &= 8 \int (1 + \cos 8x)^2 dx \\ &= 2 \int 1 dx + 2 \int \cos 8x dx + \int 1 + \cos 8x dx \\ &= 2 \int 1 dx + 2 \int \cos 4x dx + \frac{1}{2} \int \cos 8x dx \\ &= 2 \left[x + \frac{2 \sin 4x}{4x} + \frac{1}{16} \cos 8x + C \right] \\ &= 3x + \sin 4x + \frac{1}{8} \cos 8x + C \end{aligned}$$

Q27 $\frac{\pi}{2}$

$$\begin{aligned} & \int \frac{\sin^2 x}{\sqrt{1 - \cos x}} dx \\ &= \int \frac{\sin^2 x \sqrt{1 + \cos x}}{\sin x} dx \end{aligned}$$

$$= \int_{\pi/3}^{\pi/2} \sin x \sqrt{1 + \cos x} dx$$

$$= \int_{\pi/3}^{\pi/2} \sin x \sqrt{1 + \cos x} dx$$

$$= -[(1 + \cos x)]^{\pi/2}_{\pi/3}$$

$$= -\frac{2}{3} \left[1 + \cos \left(\frac{\pi}{2} \right)^{3/2} \right] - \left[1 + \cos \left(\frac{\pi}{3} \right)^{3/2} \right]$$

$$= -\frac{2}{3} + 2 \left(\frac{3}{2} \right)^{3/2}$$

$$= \frac{3}{2} - \frac{2}{3}$$

8.4

Q12

$$\int \frac{y^2 - 25}{y^3} dy$$

$$y = 5 \sec \alpha$$

$$dy = 5 \sec \alpha \tan \alpha d\alpha$$

$$\int \sec \theta \, d\theta$$

$$125 \sec^2 \theta$$

$$= \frac{1}{5} \int 25 \tan \theta \sec \theta \, d\theta$$

$$= \frac{1}{5} \int \tan^2 \theta \sec \theta \, d\theta$$

$$= \frac{1}{5} \int \sin^2 \theta \, d\theta$$

$$= \frac{1}{10} \int (1 - \cos 2\theta) \, d\theta$$

$$= \frac{1}{10} (-\sin \theta \cos \theta + C)$$

$$= \left[\frac{\sin \theta \cos \theta}{10} - \frac{y^2 - 25}{2y^2} \right] + C$$

Q) 24

N6

$$\int \frac{1}{\cos^2 \theta} \, d\theta$$

$$\frac{1}{4} \int \frac{1}{\cos^2 \theta} \, d\theta$$

$$\frac{1}{4} \int \sec^2 \theta \, d\theta$$

$$= \frac{1}{4} [\tan C - \tan A]$$

$$= \frac{1}{4} [\tan 60^\circ - \tan 30^\circ]$$

$$= \frac{\sqrt{3}}{12} = \frac{1}{4\sqrt{3}}$$