37. $\int_{1/2}^{\sqrt{3}/2} \frac{6}{\sqrt{1-t^2}}\,dt$

$$= 6\int_{\frac{1}{2}}^{\sqrt{3}/2} \frac{1}{\sqrt{1-t^2}}\,dt = 6\left(\sin^{-1} t\Big]_{1/2}^{\sqrt{3}/2}\right)$$

$$= 6\left(\sin^{-1}\frac{\sqrt{3}}{2} - \sin^{-1}\frac{1}{2}\right)$$

$$= 6\left(\frac{\pi}{3} - \frac{\pi}{6}\right) = \pi$$

35. $\int_1^9 \frac{1}{2x}\,dx$

$$= \frac{1}{2}\int_1^9 \frac{1}{x} = \frac{1}{2}\left(\ln x\Big]_1^9\right)$$

$$= \frac{1}{2}(\ln 9 - \ln 1)$$

$$= \frac{1}{2}\ln 9 = \ln 9^{1/2} = \ln 3$$

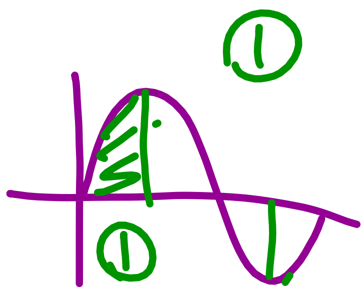
39. $\int_{-1}^{1} e^{u+1}\,du = \left. e^{u+1} \right]_{-1}^{1}$

$= e^{2} - e^{0} = e^{2} - 1$

$\int \sin 2x\,dx = -\frac{1}{2}\cos 2x + C$

41. $\int_0^{\pi} f(x)\,dx$ where $f(x) = \begin{cases} \sin x & \text{if } 0 \leqslant x < \pi/2 \\ \cos x & \text{if } \pi/2 \leqslant x \leqslant \pi \end{cases}$

$$= \int_0^{\pi/2} \sin x\,dx + \int_{\pi/2}^{\pi} \cos x\,dx = 0$$



$$-\cos x\Big]_0^{\pi/2} + \sin x\Big]_{\pi/2}^{\pi}$$

$$= -\cos\frac{\pi}{2} - (-\cos 0) + \sin\pi - \sin\frac{\pi}{2}$$

$$= 0 + 1 + 0 - 1 = 0$$