

Chapter 42

$$\begin{aligned} \textcircled{2} \int_{-\pi/2}^{\pi/2} \cos(x) dx &= \left[\sin(x) \right]_{-\pi/2}^{\pi/2} = \sin\left(\frac{\pi}{2}\right) - \sin\left(-\frac{\pi}{2}\right) \\ &= 1 - (-1) = \boxed{2} \end{aligned}$$

$$\begin{aligned} \textcircled{6} \int_1^2 \left(1 + \frac{1}{x^2}\right) dx &= \int_1^2 (1 + x^{-2}) dx \\ &= \left[x + \frac{1}{-2+1} x^{-2+1} \right]_1^2 = \left[x - x^{-1} \right]_1^2 = \left[x - \frac{1}{x} \right]_1^2 \\ &= \left(2 - \frac{1}{2}\right) - \left(1 - \frac{1}{1}\right) = \boxed{\frac{3}{2}} \end{aligned}$$

$$\begin{aligned} \textcircled{12} \int_0^{\sqrt{2}/2} \frac{1}{\sqrt{1-x^2}} dx &= \left[\sin^{-1}(x) \right]_0^{\sqrt{2}/2} \\ &= \sin^{-1}\left(\frac{\sqrt{2}}{2}\right) - \sin^{-1}(0) = \frac{\pi}{4} - 0 = \boxed{\frac{\pi}{4}} \end{aligned}$$

$$\begin{aligned} \textcircled{22} A &= \int_{1/e}^e \frac{1}{x} dx = \left[\ln|x| \right]_{1/e}^e \\ &= \ln|e| - \ln|1/e| \\ &= \ln|e| + \ln|e| \\ &= 1 + 1 = \boxed{2 \text{ square units}} \end{aligned}$$
