

2.53
24

$$\textcircled{I} \int \frac{x^2-8}{4-x^2} dx = \int \frac{(x+2)(x^2+2x+4)}{(2-x)(2+x)} dx = -\int \frac{(x+2)^2 - 2x}{2+x} dx = -\int (x+2) dx + \int \frac{2(2+x)-4}{2+x} dx =$$

$$-\frac{x^2}{2} + 2x + \int \left(2 - \frac{4}{2+x}\right) dx = -\frac{x^2}{2} + 2x + 2x - 4 \ln|2+x| + C = -\frac{x^2}{2} + 4x - 4 \ln|2+x| + C$$

$$\textcircled{II} \int \sin^2 x dx = \int (1 - \cos^2 x) \sin x dx = \int (1 - t^2) dt = t - \frac{t^3}{3} + C = -\cos x + \frac{\cos^3 x}{3} + C$$

$$\begin{aligned} -\cos x &= t \\ \sin x dx &= dt \end{aligned}$$

2.54