

$$\frac{2.75}{2.3} \textcircled{i} \int_1^2 \frac{(x+1)^3}{x^2} dx = \int_1^2 \frac{x^3 + 3x^2 + 3x + 1}{x^2} dx = \int_1^2 \left(x + 3 + \frac{3}{x} + \frac{1}{x^2}\right) dx =$$

$$= \frac{x^2}{2} + 3x + 3\ln x - \frac{1}{x} \Big|_1^2 = \left(2 + 6 + 3\ln 2 - \frac{1}{2}\right) - \left(\frac{1}{2} + 3 + 3\ln 1 - 1\right) = 5 + 3\ln 2$$

$$\textcircled{ii} \int_0^{\frac{\pi}{2}} \sin(2x) \cos x dx = \frac{1}{2} \int_0^{\frac{\pi}{2}} [\sin(3x) + \sin(x)] dx = \frac{1}{2} \left[-\frac{\cos 3x}{3} - \cos x \Big|_0^{\frac{\pi}{2}} \right] = \frac{1}{2} \left[(0-0) - \left(-\frac{1}{3} - 1\right) \right] = \frac{2}{3}$$