

$$1. \text{ Q — } \int \ln(\sqrt{x}) dx$$

$$\text{A — Let } u = \ln(\sqrt{x}) \text{ and } v' = 1.$$

$$\frac{d}{dx} \ln(\sqrt{x}) = \frac{1}{\sqrt{x}} \frac{d}{dx} x^{\frac{1}{2}}$$

$$= \frac{1}{\sqrt{x}} \frac{1}{2} x^{-\frac{1}{2}}$$

$$= \frac{1}{2} \frac{1}{\sqrt{x}} \frac{1}{\sqrt{x}}$$

$$= \frac{1}{2x}$$

$$\text{Therefore } u' = \frac{1}{2x} \text{ and } v = x$$

According to integration by parts:

$$\int uv' = uv - \int vu'$$

$$\text{Therefore } \int \ln(\sqrt{x}) dx$$

$$= \ln(\sqrt{x}) - \int \frac{1}{2} dx$$

$$= \ln(\sqrt{x}) - \frac{x}{2} + C$$