1. Q — $\int \ln(\sqrt{x})dx$

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

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

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

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

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

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

According to integration by parts:

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

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

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

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