

1. Q — $\int (x - 1) \sin(\pi x) dx$

A —

Let $u = (x - 1)$; $v' = \sin(\pi x)$. Therefore $v = -\frac{1}{\pi} \cos(\pi x)$

According to integration by parts:

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

Therefore $\int (x - 1) \sin(\pi x) dx = \frac{1-x}{\pi} \cos(\pi x) - \int -\frac{1}{\pi} \cos(\pi x) dx$

$$= \frac{1-x}{\pi} \cos(\pi x) + \frac{1}{\pi} \int \cos(\pi x) dx$$

$$= \frac{1-x}{\pi} \cos(\pi x) + \frac{1}{\pi^2} \sin(\pi x) + C$$