

#21

IBP

$$u=y \quad v=(-2)(5-y)^{3/2}$$

$$du=dy \quad dv=(5-y)^{3/2} dy$$

$$\int y(5-y)^{-1/2} dy = y(-2)(5-y)^{3/2} - \int (-2)(5-y)^{3/2} dy$$

$$= y(-2)(5-y)^{3/2} + 2 \int (5-y)^{3/2} dy$$

$$= -2y(5-y)^{3/2} + 2 \left( \frac{-2}{3} \right) (5-y)^{5/2}$$

$$\int (5-y)^{3/2} dy = \int -1 w dw = -\frac{2}{3} w^{3/2}$$

$$\begin{aligned} (w=5-y) \\ dw = -y dy \end{aligned}$$

$$\int y(5-y)^{-1/2} dy = -2y(5-y)^{3/2} + \frac{-4}{3}(5-y)^{5/2} + C$$

$$w\text{-sub } \int y(5-y)^{-1/2} dy \quad \begin{cases} w=5-y & (y=5-w) \\ dw=-dy \end{cases}$$

$$= \int (5-w) w^{-1/2} (-dw) = \int -5w^{-1/2} + w^{1/2} dw = -10w^{1/2} + \frac{2}{3}w^{3/2}$$

$$\int y(5-y)^{-1/2} dy = -10(5-y)^{1/2} + \frac{2}{3}(5-y)^{3/2}$$

$$-2y(5-y)^{3/2} + \frac{-4}{3}(5-y)^{5/2} \stackrel{P}{=} -10(5-y)^{1/2} + \frac{2}{3}(5-y)^{3/2} \quad \begin{array}{l} \text{divide by} \\ \sqrt{5-y} \end{array}$$

$$-2y + \frac{-4}{3}(5-y) \stackrel{P}{=} -10 + \frac{2}{3}(5-y)$$

$$10 - 2y \stackrel{P}{=} \frac{6}{3}(5-y)$$

$$10 - 2y \stackrel{V}{=} 2(5-y)$$

So the answers are the same!