

$$7. \int_{x=0}^{x=3} \int_{y=0}^{y=\sqrt{x}} (ye^{3x}) dy dx$$

$$= \int_{x=0}^{x=3} e^{3x} \int_{y=0}^{y=\sqrt{x}} y dy dx$$

$$= \int_{x=0}^{x=3} e^{3x} \left[\frac{1}{2} y^2 \right]_{y=0}^{y=\sqrt{x}} dx$$

$$= \frac{1}{2} \int_{x=0}^{x=3} e^{3x} \left[(\sqrt{x})^2 - (0)^2 \right] dx$$

$$= \frac{1}{2} \int_{x=0}^{x=3} x e^{3x} dx$$

$$= \frac{1}{2} \left[\frac{1}{3} x e^{3x} - \frac{1}{9} e^{3x} \right]_{x=0}^{x=3}$$

$$= \frac{1}{2} \left[\frac{1}{3}(3) e^{3(3)} - \frac{1}{9} e^{3(3)} - \left(\frac{1}{3}(0) e^{3(0)} - \frac{1}{9} e^{3(0)} \right) \right]$$

$$= \frac{1}{2} \left[e^9 - \frac{1}{9} e^9 + \frac{1}{9} e^0 \right]$$

$$= \frac{1}{2} \left[\frac{9}{9} e^9 - \frac{1}{9} e^9 + \frac{1}{9} \right]$$

$$= \frac{1}{2} \left(\frac{8}{9} e^9 + \frac{1}{9} \right)$$

$$= \frac{1}{18} (8e^9 + 1)$$

<u>S</u>	<u>D</u>	<u>T</u>
+	→ X	e ^{3x}
-	→ 1	↓ $\frac{1}{3} e^{3x}$
+	0	↓ $\frac{1}{3} \cdot \frac{1}{3} e^{3x}$
		↓ $\frac{1}{9} e^{3x}$

$$\int e^{3x} dx$$

$$u = 3x \quad du = 3 dx$$

$$\frac{1}{3} \int 3 e^{3x} dx$$

$$\frac{1}{3} \int e^u du$$

$$\frac{1}{3} e^u$$

$$\frac{1}{3} e^{3x}$$