

$$12. \int_1^e \frac{5+2x}{3x} dx$$

$$u = 5+2x \quad du = \frac{1}{x} dx$$

$$= \frac{1}{3} \int_1^e \frac{5+2x}{x} dx$$

$$= \frac{1}{3} \int_1^e (5+2x) \cdot \frac{1}{x} dx$$

$$= \frac{1}{3} \int_{x=1}^{x=e} u du$$

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

$$= \frac{1}{3} \cdot \frac{1}{2} \left[(5+2x)^2 \right]_1^e$$

$$= \frac{1}{6} \left[(5+2e)^2 - (5+2 \cdot 1)^2 \right]$$

$$= \frac{1}{6} \left[(5+2)^2 - (5)^2 \right]$$

$$= \frac{1}{6} \left[6^2 - 5^2 \right]$$

$$= \frac{1}{6} [36 - 25]$$

$$= \frac{1}{6} (11)$$

$$= \left(\frac{11}{6} \right)$$