

Rewrite each definite integral in terms of  $u$  and  $du$  and then evaluate the resulting definite integral

$$\frac{1}{4} \left[ \frac{2}{3}(7^{3/2}) - \frac{2}{3}(3^{3/2}) \right]$$

$$1. \int_{2}^{3} \sqrt{4x-5} dx \quad \text{Let } u = 4x - 5$$

$$u(2) = 3 \\ u(3) = 7$$

$$\int_3^7 \sqrt{u} du$$

$$\frac{du}{dx} = 4$$

$$\frac{du}{4} = dx$$

$$\int_3^7 u^{1/2} \frac{du}{4} = \frac{1}{4} \int_3^7 u^{1/2} du =$$

$$= \frac{1}{4} \left[ \frac{2}{3} u^{3/2} \right]_3^7$$

$$= \left[ \frac{1}{6} (7^{3/2}) - \frac{1}{6} (3^{3/2}) \right]$$

$$2. \int_0^1 \frac{x^2}{\sqrt{x^3 + 4}} dx \quad \text{Let } u = x^3 + 4$$

$$u(0) = 4 \\ u(1) = 5$$

$$\int_4^5 \frac{x^2}{\sqrt{u}} du$$

$$\frac{du}{dx} = 3x^2$$

$$\frac{du}{3x^2} = dx$$

$$\int_4^5 \frac{x^2}{\sqrt{u}} \cdot \frac{du}{3x^2}$$

$$\frac{1}{3} \int_4^5 \frac{1}{\sqrt{u}} du = \left[ \frac{1}{3} \int_4^5 u^{-1/2} du \right]$$

$$= \frac{1}{3} \left[ 2u^{1/2} \right]_4^5 = \frac{1}{3} [2\sqrt{5} - 2\sqrt{4}]$$