

4. Evaluate the following integrals.

$$\text{a. } \int \frac{x}{\sqrt{3x-5}} dx = \int \frac{u+5}{3} \cdot u^{-1/2} \cdot \frac{1}{3} du = \frac{1}{9} \int (u^{1/2} + 5u^{-1/2}) du$$

$u = 3x - 5 \Rightarrow x = \frac{u+5}{3}$
 $du = 3 dx$

$$= \frac{1}{9} \cdot \left(\frac{u^{3/2}}{3/2} + 5 \cdot \frac{u^{1/2}}{1/2} \right) + C$$

$$= \frac{2}{27} (3x-5)^{3/2} + \frac{10}{9} (3x-5)^{1/2} + C$$

$$\text{b. } \int_0^{\pi/3} \sin(x) \sin(\pi \cos(x)) dx = \int_{\pi}^{\pi/2} \sin u \cdot \left(-\frac{1}{\pi} du \right) = \frac{1}{\pi} \cos u \Big|_{\pi}^{\pi/2}$$

$u = \pi \cos x$
 $du = -\pi \sin x dx$

$$= \frac{1}{\pi} \underbrace{\cos(\pi/2)}_0 - \frac{1}{\pi} \underbrace{\cos(\pi)}_{-1} = \frac{1}{\pi}$$