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Section: O

8.8
$$\int_0^4 \int_{-2}^{\sqrt{x}} \frac{1}{\sqrt{x^2+y^2}} \, dy \, dx$$

$0 \leq x \leq 2 \qquad -x \leq y \leq \sqrt{3}$

$x = \frac{2-0}{2} = 1 \qquad 0, 1, 2$

For $x = 0$, $k_1 = \frac{\sqrt{x}+x}{2} = 0 \qquad y_R = 0$

$I(0,0) = \frac{0}{2} \left[f(0,0) + 2f(0,0) + f(0,0) \right]$

$\qquad = 0$

for $x = 1$, $k_2 = \frac{\sqrt{1}+1}{1} = 1 \qquad y_R = 1, 2, 3$

$I(1,1) = \frac{1}{2} \left[f(1,1) + 2f(1,2) + f(1,3) \right]$

$\qquad = \frac{1}{2} \times [0.707 + 0.894 + 0.316]$

$\qquad \approx 0.3585$

for, $x = 2$, $k_3 = \frac{\sqrt{2}+2}{2} = 1.707$

$\qquad y_R = 2, 3.707, 5.414$

$$I(2, 1.707) = \frac{1.707}{2}\left[f(2,2) + 2f(2, 3.707)\right.$$
$$\left. + f(2, 5.414)\right.$$
$$= \frac{1.707}{2}\left(0.354 + 0.475 + 0.173\right)$$
$$= 0.855$$

$$\int_0^2 \int_{-x}^{\sqrt{x}} \frac{1}{\sqrt{x^2+y^2}}\, dy\, dx = \frac{1}{2} \times \left(0 + 2 \times (0.9585)\right)^{0.855}_{0.855}$$
$$= 1.386$$