Answer on Question #57094 – Math – Calculus

Prove:

$$\iint (x+y)dxdy = \frac{241}{60}$$

Solution

$$\iint (x+y)dxdy = \int_0^3 dy \int_1^{\sqrt{(4-y)}} (x+y)dx = \int_0^3 dy \left(\frac{x^2}{2} + x*y\right)\Bigg|_1^{\sqrt{(4-y)}}$$

$$= \int_0^3 \left(\frac{4-y}{2} + y\sqrt{(4-y)} - \frac{1}{2} - y\right) dy$$

$$= \int_0^3 \left(\frac{3}{2} - \frac{3y}{2} + y\sqrt{(4-y)} - 4\sqrt{(4-y)} + 4\sqrt{(4-y)}\right) dy$$

$$= \int_0^3 \left(\frac{3}{2} - \frac{3y}{2} - (4-y)\sqrt{(4-y)} + 4\sqrt{(4-y)}\right) dy =$$

$$= \int_0^3 \left(\frac{3}{2} - \frac{3y}{2} - \sqrt{(4-y)^3} + 4\sqrt{(4-y)}\right) dy$$

$$= \left(\frac{3}{2}y - \frac{3y^2}{4} + \frac{2}{5}\sqrt{(4-y)^5} - \frac{8}{3}\sqrt{(4-y)^3}\right)\Bigg|_0^3 = \frac{9}{2} + \frac{27}{4} + \frac{2}{5} - \frac{8}{3} - \frac{64}{5} + \frac{64}{3}$$

$$= \frac{241}{60}$$