# Answer on Question #55955 – Math - Calculus

## Question

Prove that ∫03 ∫1 √4-y(x+y)dxdy=241/60

### Solution

$$\int_0^3\int_1^{\sqrt{4-y}}(x+y)dxdy=\int_0^3\left(\frac{1}{2}x^2+yx\right)\Big|_1^{\sqrt{4-y}}dy=\int_0^3\left(\frac{4-y}{2}+y\sqrt{4-y}-\frac{1}{2}-y\right)dy=\frac{3}{2}\int_0^3 dy-\frac{3}{2}\int_0^3 ydy+\int_0^3 y\sqrt{4-y}dy$$

$$\frac{3}{2}\int_0^3 dy=\frac{3}{2}y\Big|_0^3=\frac{9}{2}$$

$$-\frac{3}{2}\int_0^3 ydy=-\frac{3}{4}y^2\Big|_0^3=-\frac{27}{4}$$

$$\int_0^3 y\sqrt{4-y}dy=\{z=4-y\}=-\int_4^1(4-z)\sqrt{z}dz=4\frac{2}{3}z^{\frac{3}{2}}\Big|_1^4-\frac{2}{5}z^{\frac{5}{2}}\Big|_1^4=\frac{56}{3}-\frac{62}{5}$$

Thus,

$$\int_0^3\int_1^{\sqrt{4-y}}(x+y)dxdy=\frac{9}{2}-\frac{27}{4}+\frac{56}{3}-\frac{62}{5}=\frac{241}{60}$$