2) Evaluate the following:

a) $\int_0^3 \int_0^{\sqrt{9-x^2}} 2x \, dydx$

$$\int_0^3 2xy \Big]_{y=0}^{y=\sqrt{9-x^2}} dx = \int_0^3 2x \cdot \sqrt{9-x^2} \, dx$$

$u = 9 - x^2$
$du = -2x \, dx$
$-du = 2x \, dx$

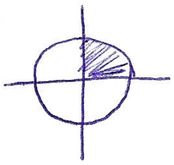
$$= \int_9^0 -\sqrt{u} \, du = -\frac{2u^{3/2}}{3} \Big|_9^0 = 0 - -\frac{2}{3} 9^{3/2} = \frac{2}{3} \cdot 27 = 18$$

b) $\int_0^\pi \int_0^{\pi/2} cosx \, cosy \, dydx$ $= \int_0^\pi \cos x \sin y \Big|_{y=0}^{y=\pi/2} dx$

$$= \int_0^\pi \cos x \, dx$$

$$= \sin x \Big|_0^\pi = 0 - 0 = 0$$

3) The integral in 2a can be done by switching to polar coordinates. (Do that) Note if you did 2a by switching to polar coordinates then do the integral as written here.



$y = \sqrt{9-x^2}$
$y^2 = 9 + x^2$
$x^2 + y^2 = 9$
but $y > 0$

$$\int_0^{\pi/2} \int_0^3 2(r\cos\theta) \cdot r \, dr \, d\theta$$

$$= \int_0^{\pi/2} \int_0^3 2r^2 \cdot \cos\theta \, dr \, d\theta$$

$$= \int_0^{\pi/2} \frac{2r^3}{3} \cos\theta \Big|_{r=0}^{r=3} d\theta = \int_0^{\pi/2} 18 \cos\theta \, d\theta = 18 \sin\theta \Big|_0^{\pi/2}$$

$$= 18 - 0 = 18$$