$\int_{-r}^{r} \frac{r\,dy}{\sqrt{r^2-y^2}}$ can be done in two ways:

(a) subst. $y = rt$ to get $\int_{-1}^{1} \frac{dt}{\sqrt{1-t^2}} = \left[\arcsin t\right]_{-1}^{1}$

(b) subst. $y = r\sin\varphi$ to get a very simple integral:

outer half of surface = ...

$$\ldots = 2\pi R \int_{-r}^{r} \frac{r\,dy}{\sqrt{r^2-y^2}} + 4\pi r^2 = 2\pi R \int_{-\pi/2}^{\pi/2} \frac{r^2 \cos\varphi\,d\varphi}{r\cos\varphi} + 4\pi r^2$$

$y = r\sin\varphi$

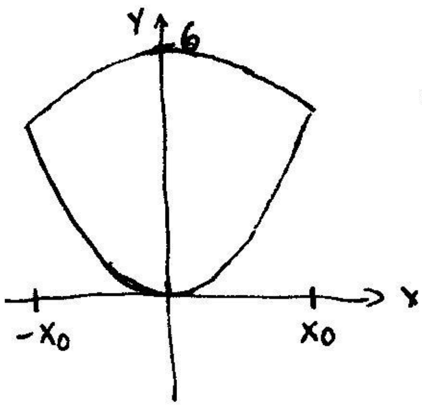
$dy = r\cos\varphi\,d\varphi$

$$= 2\pi R\cdot\pi r + 4\pi r^2$$

inner half of surface similarly: $2\pi R\cdot\pi r - 4\pi r^2$

total surface of torus: $\underline{\underline{2\pi R\cdot 2\pi r}}$

<u>#26:</u> (a) Must make a sketch first:



positive intersection point x_0: $6 - \frac{1}{2}x_0^2 = x_0^2$

conclude: $\underline{x_0 = 2}$

$$\text{Area} = \int_{-2}^{2}\left(6 - \frac{1}{2}x^2 - x^2\right)dx$$

$$= \int_{-2}^{2}\left(6 - \frac{3}{2}x^2\right)dx = \left[6x - \frac{1}{2}x^3\right]_{-2}^{2}$$

$$= 2\left(12 - \frac{8}{2}\right) = \underline{\underline{16}}$$