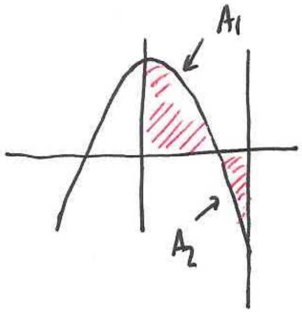
Key v 12

1.

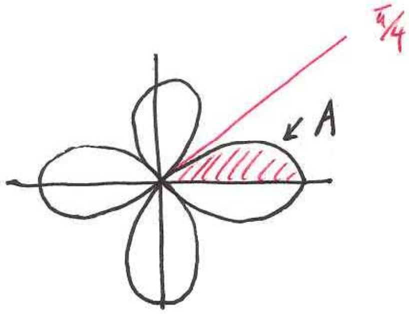


$$A_1 = \int_0^2 (12-3x^2)\,dx = 16$$

$$A_2 = \int_2^3 [0-(12-3x^2)]\,dx = 7$$

$$\text{Area} = 16+7 = 23$$

2.



$$A = \frac{1}{2}\int_0^{\frac{\pi}{4}} [6\cos 2\theta]^2\,d\theta$$

$$= 18\int_0^{\frac{\pi}{4}} \frac{1+\cos 4\theta}{2}\,d\theta$$

$$= 9\left[\theta + \frac{\sin 4\theta}{4}\right]\Big|_0^{\pi/4} = 9\frac{\pi}{4}$$

Area of one petal $= 2A$

$= 9\frac{\pi}{2}$

3. $$S = 2\left[\int_0^{\frac{\pi}{4}} \sqrt{(6\cos 2\theta)^2 + (-12\sin 2\theta)^2}\,d\theta\right]$$

4a) $$V = \pi\int_0^3 (18-2x^2)^2\,dx = 2\pi\int_0^{18} y\sqrt{\frac{18-y}{2}}\,dy$$

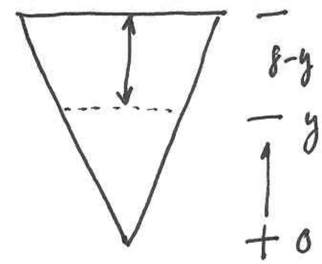
b) $$V = 2\pi\int_0^3 (x+2)(18-2x^2)\,dx = \pi\int_0^{18}\left[\left(\sqrt{\frac{18-y}{2}}+2\right)^2 - 2^2\right]dy$$

5. $$S = \int_0^{\pi/2} \sqrt{1 + (-2x\sin x + 2\cos x)^2}\,dx$$

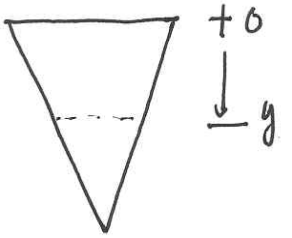
6. $$L = \int_0^{\pi/2} 2\pi(2x\cos x+1)\sqrt{1+(-2x\sin x+2\cos x)^2}\,dx$$

7.

$$F = \int_0^8 62.4\,(8-y)\,\frac{5}{4}y\,dy$$



$l(y) = \frac{5}{4}y$



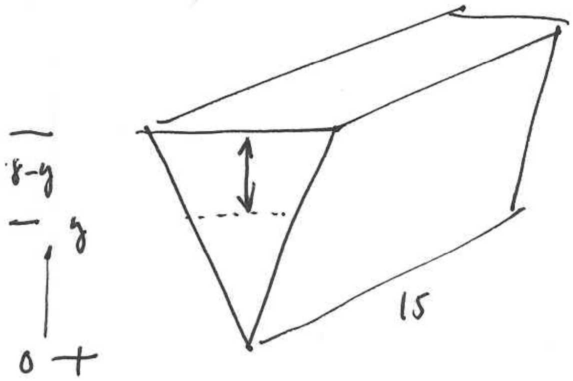
$l(y) = 10 - \frac{5}{4}y$

$$= \int_0^8 62.4\,y\left(10 - \frac{5}{4}y\right)dy$$

$$= 62.4\left(\frac{320}{3}\right) = 6656$$

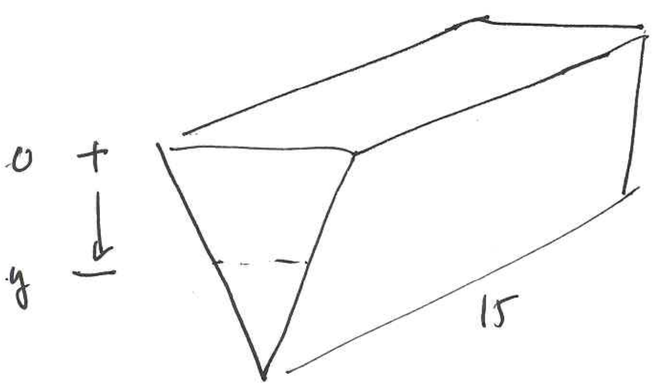
8.

$$W = \int_0^8 62.4\,(8-y)\,15\,\frac{5}{4}y\,dy$$



$$= \int_0^8 62.4\,y\,15\left(10 - \frac{5}{4}y\right)dy$$

$$= 62.4\,(15)\,\frac{320}{3} = 99{,}840$$



$l(y) = 10 - \frac{5}{4}y$