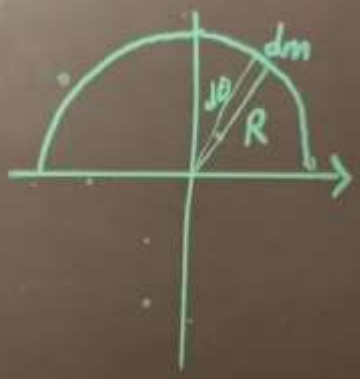
2. 由于对称性，x分量引力为0

$$dm = \frac{m}{\pi R} \times R d\theta$$

$$= \frac{m}{\pi} d\theta$$



$$\therefore dF_y = G \frac{dm}{R^2} \cdot \sin\theta$$

$$= G \frac{m}{\pi R^2} d\theta \sin\theta \, d\theta$$

$$\int_0^{F_y} dF_y = \int_0^{\pi} \frac{Gm}{\pi R^2} \sin\theta \, d\theta$$

$$F_y = \frac{Gm}{\pi R^2} \left[-\cos\theta \right] \Big|_0^{\pi}$$

$$= \frac{Gm}{\pi R^2} \left(-\cos\pi + \cos 0 \right)$$

$$F_y = \frac{2Gm}{\pi R^2}$$