

2. 由于对称性, x 分量引力为0

$$\begin{aligned} dm &= \frac{m}{\pi R} \times R d\theta \\ &= \frac{m}{\pi} d\theta \end{aligned}$$



$$\begin{aligned} dF_y &= G \frac{dm}{R^2} \cdot \sin\theta \\ &= G \frac{m}{\pi R^2} \sin\theta d\theta \end{aligned}$$

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

$$\begin{aligned} F_y &= \frac{Gm}{\pi R^2} [-\cos\theta] \Big|_0^{\pi} \\ &= \frac{Gm}{\pi R^2} (-\cos\pi + \cos 0) \end{aligned}$$

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