

7-11 (Quantum rigid body)

$$I_{\text{disk}} = 10^{-5} \text{ kgm}^2$$

a) $L = I\omega$

$$= (10^{-5} \text{ kgm}^2)(2\pi \cdot 735 \cdot 60)$$

$$L = 0.00077 \frac{\text{kgm}^2}{\text{s}}$$

b) According to quantum theory, angular momentum is quantized

$$L = \hbar \sqrt{l(l+1)}$$

So

$$\left(\frac{L}{\hbar}\right)^2 = l(l+1) = 5.3 \times 10^{61} \approx l^2$$

↓

$$l^2 + l - \left(\frac{L}{\hbar}\right)^2 = 0$$

$$\boxed{l \approx 7.3 \times 10^{30}}$$

~~$l + l = 5.3 \times 10$~~