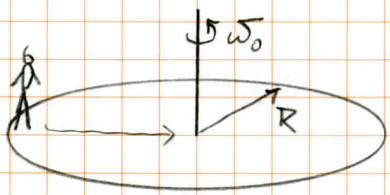
T3 PR 8.66

3) T3 8-66 A WOMAN (m) WALKS INWARD FROM THE EDGE OF A TURNTABLE. WHAT IS THE FINAL ANGULAR VELOCITY?



$I_{TURNTABLE} = I$

$I_{WOMAN,\ CENTER} = \frac{I}{10}$

$m_w R^2 = 3I$

ANGULAR MOMENTUM IS CONSERVED

$$L_i = L_f$$

$$(I_{W,EDGE} + I_{TT})\omega_0^2 = (I_{W,CENTER} + I_{TT})\omega_f^2$$

$$I_{W,CENTER} = \frac{I}{10}$$

- USE ∥ AXIS THM TO FIND $I_{W,EDGE}$

$$I_{W,EDGE} = I_{W,CENTER} + M_W R^2$$

$$= \frac{I}{10} + 3I$$

$$I_{W,EDGE} = 3.1I$$

$$\Rightarrow (3.1I + I)\omega_0 = \left(\frac{I}{10} + I\right)\omega_f$$

$$4.1 I \omega_0 = 1.1 I \omega_f$$

$$\omega_f = \sqrt{\frac{4.1}{1.1}}\,\omega_0$$

$$\boxed{\omega_f = 3.73\,\omega_0}$$