Exercise 9-19

(a) $a_t = r\alpha \quad \therefore \alpha = \frac{a_t}{r} = \frac{-15.0\ m/s^2}{0.300\ m} = -50.0\ rad/s^2$

(b) $v = r\omega \quad \therefore \omega = \frac{v}{r}$

At $t = 4.00\ s$, $\omega = \frac{45.0\ m/s}{0.300\ m} = 150\ rad/s$

$\omega = \omega_0 + \alpha t \quad \therefore \omega_0 = \omega - \alpha t$

$= 150\ rad/s - \left(-50.0\ \frac{rad}{s^2}\right)(4.00\ s)$

$= 350\ rad/s$

(c) $\theta = \omega_0 t + \frac{1}{2}\alpha t^2$

$= \left(350\ \frac{rad}{s}\right)(4.00\ s) + \frac{1}{2}\left(-50.0\ \frac{rad}{s^2}\right)(4.00\ s)^2$

$= 1.00 \times 10^3\ rad$