

Example 3.4.1

01/1

We can have Gear 2 roll over Gear 1 clockwise, or counterclockwise.

Clockwise (like the book).

$$\Theta = -\frac{\pi}{2}$$

$$\Theta = \frac{R_1 (\phi_1 + \Theta_1) + R_2 (\phi_2 + \Theta_2 - \pi)}{R_1 + R_2}$$

$$\therefore -\frac{\pi}{2} = \frac{1 \left(0 + \frac{\pi}{2}\right) + 2 \left(\phi_2 + \frac{7\pi}{6} - \pi\right)}{3} = \frac{\frac{\pi}{2} + \frac{2\pi}{3} + 2\phi_2}{3}$$

$$\Rightarrow -\frac{\pi}{2} = \frac{\frac{\pi}{2} + 2\phi_2}{3} \Rightarrow -3\pi = \pi + 4\phi_2 \Rightarrow \boxed{\phi_2 = -\pi}$$

Counterclockwise:

$$\Theta = \frac{3\pi}{2}$$

$$\frac{3\pi}{2} = \frac{R_1 (\phi_1 + \Theta_1) + R_2 (\phi_2 + \Theta_2 - \pi)}{R_1 + R_2} = \frac{\frac{\pi}{2} + 2\phi_2}{3}$$

$$\text{Then } 9\pi = \pi + 4\phi_2 \Rightarrow \boxed{\phi_2 = 2\pi}$$

