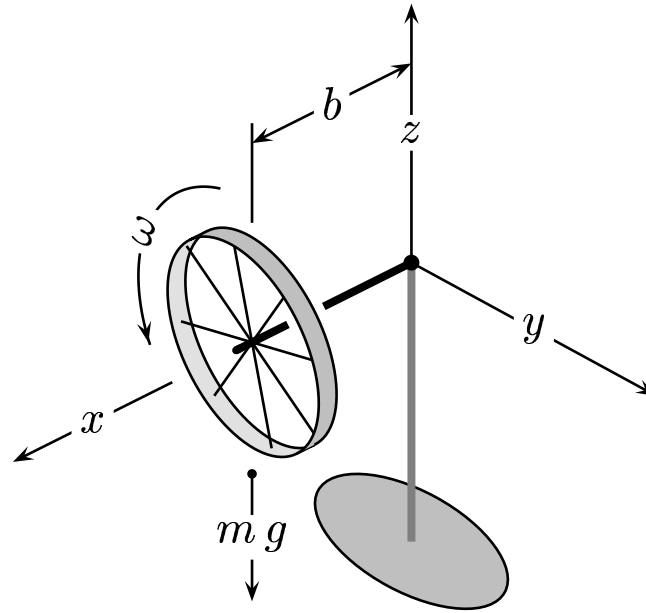


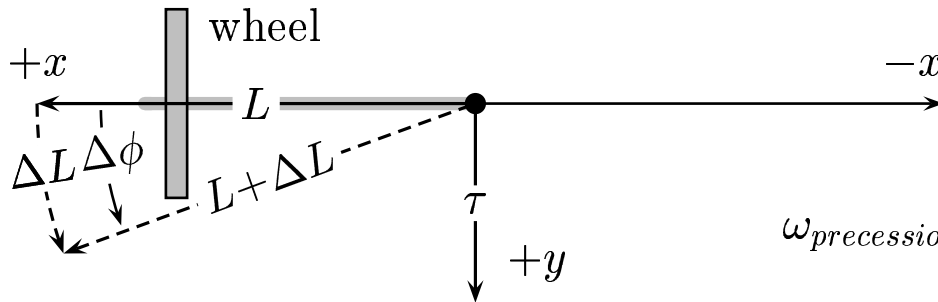
Given: This set up is a rotating bike wheel. At the moment, the angular momentum is pointing along  $x$ -axis. The wheel's axel is pivoted a distance  $b$  from the wheel's center of rotation.



Determine the direction of precession about the  $z$ -axes as viewed from the top.

- A) clockwise. B) counterclockwise.  
 C) There is no precession since angular momentum is conserved.

**Viewed from Above**



$$\omega_{precession} = \frac{\Delta\phi}{\Delta t} = \frac{\Delta L}{L \Delta t} = \frac{m g b}{I \omega}.$$

The torque " $\tau = b \times m g$ " due to the weight of the wheel is along the positive  $y$ -direction. This implies that the change in  $\vec{L}$  ( $\Delta L = \tau \Delta t$ , since  $\tau \equiv \frac{dL}{dt}$ ) is along the positive  $y$ -direction.

As viewed from the top, the increment  $\Delta L$  is down, which leads to a counterclockwise motion.

Answer **B**.