## Homework H.3.F

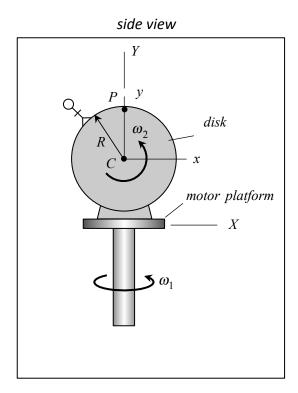
Given: A motor rests on a platform at the top of a vertical shaft, with the shaft rotating about a fixed, vertical axis at a constant rate of  $\omega_1$ . A disk of radius R is attached to the output shaft of the motor at a distance of 2R from the vertical shaft axis at O. The motor turns at a constant rate of  $\omega_2$ . A set of xyz-coordinate axes are attached to the disk. Point P lies on the perimeter of the disk on the y-axis. At the position shown, the y-axis is aligned with the vertical shaft axis.

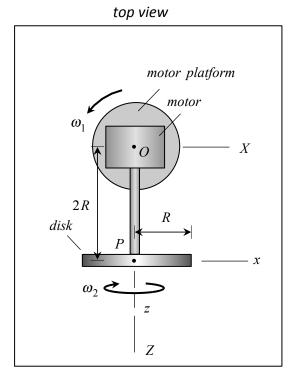
Find: For the position shown,

- (a) determine the angular velocity and angular acceleration of the disk.
- (b) determine the velocity and acceleration of P on the disk.

Leave your answers in terms of, at most, R,  $\omega_1$  and  $\omega_2$ . Write your answers as vectors in terms of their xyz-components.

HINT: Consider using an observer attached to the disk, as shown.





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