1. Taylor: Problem 1.46. (c) Consider the same three combinations of angular and linear velocities as in problem 1.27. For each case, calculate the position \((r', \phi')\) of the puck in the rotating coordinate systems at \(t\) equal \(R/2v\), \(3R/2v\), and \(2R/v\). Plot your results.

2. Taylor: Problem 1.47.

3. Taylor: Problem 1.49.

Quiz version:
Imagine two concentric cylinders, centered on the vertical \(\hat{z}\) axis in Earth gravitational field, with radii \(R \pm \epsilon\), where \(\epsilon\) is very small. A small frictionless puck of thickness \(2\epsilon\) and mass \(m\) is inserted between the two cylinders, so that it can be considered a point mass that can move freely at a fixed distance from axis \(\hat{z}\). Use cylindrical coordinates to solve Newton’s equations of motion for the puck. Next, describe this motion verbally. The second derivative of vector \(\mathbf{r}\) in cylindrical coordinates is
\[
\ddot{\mathbf{r}} = (\ddot{\rho} - \rho \dot{\phi}^2) \hat{\rho} + (\rho \ddot{\phi} + 2 \dot{\rho} \dot{\phi}) \hat{\phi} + \ddot{z} \hat{z}
\]

4. Taylor: Problem 2.4.

5. A block of mass \(m\) slides down a frictionless inclined plane under the influence of gravity. The angle of the inclination of the plane is \(\theta\). The motion is resisted by a force \(F_r = kv^2\), where \(k\) is a constant and \(v\) is the (variable) velocity of the block, acting opposite to the direction of motion. The particle starts from rest. Calculate the time needed for the block to move a distance \(d\) along the incline. Use integral tables to find the integrals that are needed and cite the source.