Homework No. 08 (Fall 2021)

PHYS 203A: COLLEGE PHYSICS

Department of Physics, Southern Illinois University–Carbondale

Due date: Tuesday, 2021 Nov 2, 12.30pm, on D2L

Instructions

- Describe your thought process in detail and organize it clearly. Make sure your answer has the correct units and the right number of significant digits.
- After completion, scan the pages as a single PDF file, and submit the file on D2L (Assesments → Assignments).

1. (**10 points.**) A wheel rotating about a fixed axis through its center has a constant angular acceleration of 4.0 rad/s^2. In a certain 4.0 s interval the wheel turns through an angle of 80 rad.
   (a) What is the angular velocity of the wheel at the start of the 4.0 s interval?
   (b) What is the angular velocity of the wheel at the end of the 4.0 s interval?
2. (**10 points.**) A turntable is rotating with a constant angular speed of 6.5 rad/s. You place a penny on the turntable.
   (a) List the forces acting on the penny.
   (b) Which force contributes to the centripetal acceleration of the penny?
   (c) What is the farthest distance away from the axis of rotation of the turntable that you can place a penny such that the penny does not slide away? The coefficient of static friction between the penny and the turntable is 0.5.
3. (**10 points.**) A fan blade is rotating with a uniform angular acceleration of 10.0 rad/s^2. At what point on the blade, as measured from the axis of rotation, does the magnitude of the tangential acceleration equal that of the acceleration due to gravity?
4. (**10 points.**) A motorcycle accelerates uniformly from rest and reaches a linear speed of 24.0 m/s in a time of 8.00 s. The radius of each tire is 0.300 m. What is the magnitude of the angular acceleration of each tire?