Non Inertial Frames Questions

1. An object is launched North from the equator with a velocity of 1000 m/s. Estimate the deflection after it travels 1 kilometer. Which direction is it deflected?

2. A football is kicked towards a field goal that is 50 yards away. What's the difference in the path if the field is at a longitude of 30 degree N-S orientation vs. E-W orientation?

3. Suppose you have a spaceship that is a large cylinder of radius 5 meters. How fast would this have to rotate so that the human experiences a 0.5 gs? What is the difference in force between the head and feet of a standing person? Suppose the person is sitting down and stands up, what is the sideways force acting on the person during this stand up?

4. The JWST is located at L2 Lagrange point. This is a location past the orbit of the Earth. However, the JWST orbits with the same angular velocity as the Earth. Use the centrifugal force to estimate the distance from the Earth to the JWST.

5. A penny sits on a rotating disk (it's a record player) a distance of 7 cm from the axis of rotation. The coefficient of static friction between the disk and penny is 0.3. The record player starts from rest and increases in angular velocity with an angular acceleration of 1 rad/s^2. How long will it take for the penny to slide? Bonus: if the coefficient of kinetic friction is 0.2, what path will the penny take when it starts to slide?

6. Can you explain and model the turntable paradox?
   https://youtu.be/3oM7hX3UUEU?si=JNFvYlfaBPzG9y3h