

TRUE FALSE

1. For a two-wheeled differentially steered robot, for any given wheel speeds, one can always find an instantaneous center of rotation.

2. Odometry can be made completely accurate, by simply reducing the integration time step dt as much as possible.

3. When a torque is applied to a wheel, the forward-pointing (friction-generated) force equals the torque divided by the radius of the wheel.

1. This is true. No matter what the wheel speeds are, there is always a point (which, of course, moves around with the robot, and as the wheel speeds change) such that the robot's motion can be described as a pure rotation around the same point.
2. This is false: Even though one can reduce the odometric error by using a small dt , one cannot eliminate altogether since (for example) the encoder wheels have a limited number of sectors and the kinematic model is also never perfectly accurate.
3. This is false (see the left panel of Fig. 2.3 in the lecture notes): If it were true, the wheel would not rotate (see Eq. (2.13)). Instead, it is the difference between (i) the torque and (ii) the product of the forward-pointing (friction-generated) force and the wheel radius that causes the rotation of the wheel.