1) Explain the forces action on an accelerating vehicle and the most significant factors that influence its motion?

2) If a race car with 3000-lb has 200-inch wheelbase and a center of gravity 36 inches above the roadway and is running on a pavement with coefficient of adhesion of 1.0. how far back from the front axle would be the center of gravity have to develop a maximum acceleration from rest of 1.0g (assume γm =1, frl=0.01)

**3)** car is traveling at **20 mi/h** on **good, dry pavement** at 5000 ft elevation. The front-wheel-drive car has a drag coefficient of **0.30**, a frontal area of **20 ft2** and a weight of **2500 lb**. The wheelbase is **110 inches**, and the center of gravity is **20 inches** from the ground, **50 inches** behind the front axle. The engine is producing **95 ft-lb** of torque and is in a gear that gives an overall gear reduction ratio of **4.5**. The radius of the drive wheels is **14 inches**, and the mechanical efficiency of the drivetrain is **90%.** What would the acceleration of the car be if the driver was accelerating quickly to avoid a collision?

4) If the car in Example 2.8 had CD = 0.45 and Af = 25 ft2, what is the difference in minimum theoretical stopping distances with and without aerodynamic resistance considered (all other factors the same as in Example 2.8)?

5) A test of a driver’s perception/reaction time is being conducted on a special testing track with **wet pavement** and a driving speed of **50 mi/h**. When the driver is **sober**, a stop can be made just in time to avoid hitting an object that is first visible **385 ft** ahead. After a few drinks under exactly the same conditions, the driver fails to stop in time and strikes the object at a speed of **30 mi/h.** Determine the driver’s perception/reaction time before and after drinking. (Assume practical stopping distance.)