Session 3

1. Two balls 4 cm in diameter are placed 100 m apart on a frictionless horizontal plane at 43 °N. If the balls are impulsively propelled directly at each other with equal speeds, at what speed must they travel so that they just miss each other?

2. Show that the geostrophic balance in isobaric coordinates may be written

$$f\mathbf{U_g} = \mathbf{k} \times \nabla_p \Phi$$

3. An aircraft flying a heading of 60° (i.e., 60° east of north) at air speed 200 m/s moves relative to the ground due east (90°) at 225 m/s. If the airplane is flying at constant pressure, what is its rate of change in altitude in meters per kilometer of horizontal distance assuming a steady pressure field, geostrophic winds, and $f = 10^{-4}$ 1/s.