## Session 1

1. A ship is steaming northward at a rate of 10 km/h. The surface pressure increases toward the northwest at the rate 5 Pa/km. What is the pressure tendency recorded at a nearby island station if the pressure aboard the ship decreases at a rate 100 Pa/3 h.

2. Given the motion of the continuum:

$$x = x_0 + kty_0 \quad y = (1 + kt)y_0 \quad z = z_0$$

and the temperature field in the spatial description:

$$T = \alpha(x + y)$$

find

   (a) the material description of the temperature field,
   (b) the velocity field in both material and spatial descriptions,
   (c) the divergence of the velocity field.

3. Show that a homogeneous atmosphere (density independent of height) has a finite height that depends only on the temperature at the lower boundary. Compute this height and temperature profile for surface temperature $T_0 = 273$K and surface pressure 1000 hPa.