1. The surface sensible heat flux \( F_s = \rho c_p w' T' = 1000 \text{ W m}^{-2} \) and the atmospheric boundary layer (ABL) depth \( h = 500 \text{ m} \). How much does the average ABL temperature change during 3 h? Use \( \rho = 1.2 \text{ kg m}^{-3} \).

2. Same as problem 1 but in this case \( F_s = -50 \text{ W m}^{-2} \) and \( h = 50 \text{ m} \).

3. 1 cm of water evaporates from the ocean into an ABL that is 500 m deep.
   (a) What is the change in the average ABL water vapor mixing ratio (mass of water vapor per unit mass of dry air), \( \Delta q \)? Use \( \rho = 1.2 \text{ kg m}^{-3} \).
   (b) If this process occurs over 4 h, what is the average surface flux of water vapor, \( F_q = \rho w' q' \)?
   (c) What is the latent heat flux, \( L F_q \)? \( L = 2.5 \times 10^6 \text{ J kg}^{-1} \) is the latent heat of vaporization.

4. The friction velocity \( u_* = 0.3 \text{ m s}^{-1} \).
   (a) What is the magnitude of the surface stress? Use \( \rho = 1.2 \text{ kg m}^{-3} \).
   (b) If \( h = 500 \text{ m} \), how much would the average ABL wind velocity change over 24 h due to the surface stress alone? Assume that the wind velocity and surface stress vectors are parallel.
   (c) What additional forces act to maintain the ABL wind?