Homework 3

1. (50 pts) Assume that the atmospheric Ekman layer over the earth's surface at latitude 45 $^{\circ}$N can be modelled with a turbulent kinematic viscosity $\nu = 10$ m$^2$/s. If the geostrophic velocity above the layer is only in the x-direction and uniformly 10 m/s, what is the magnitude and direction of the Ekman transport? Is there any vertical velocity? (Hint: the dynamics of the atmosphere bottom Ekman layer is similar to that of the ocean bottom Ekman layer)

2. (50 pts) Internal waves are generated along the coast of Norway by the M$_2$ surface tide that has a period of 12.42 h. If the buoyancy frequency $N$ is $2 \times 10^{-3}$ s$^{-1}$, at which possible angles can the energy propagate with respect to the horizontal plane if the Earth's rotation is not considered?