Homework #4 Due, class time 2/22

1. You fire a projectile up. If the force of air resistance is –kmv, find an expression for how long it takes to reach its maximum height. By making an expansion, or otherwise, check that when $k \to 0$ it becomes the expected expression for no air resistance.

2. A child on a sled starts at rest and slides down a slope 30 degrees to the horizontal for a distance of 100m (measured along the slope), and then slides a further 100m along the level before friction eventually brings him to a stop. Calculate the coefficient of friction between the sled and the snow.

3. Find whether these forces are conservative, and if they are, find the potential, U, that corresponds to each force (a, b and c are constants).

a) $\mathbf{F}=(ayz+bx+c)\mathbf{i} + (axz+bz)\mathbf{j} + (axy+by)\mathbf{k}$
b) $\mathbf{F}=x^2y\mathbf{i} + y^2x\mathbf{j}$