# Question 1:

Two pendula of equal length *l* but different masses *m* and 2*m* swing in vacuum in the gravitational field with the acceleration *g*. Use dimensional analysis to determine which pendulum will have a longer period.

**Question 2:**

The analogue of the elastic modulus for fluids (the bulk modulus) is given by *E* = *c*2, where **

is the fluid density and *c* is the the sound speed. Then the relationship between the stress and strain in the fluid can be presented by the formula *p* = *c*2**(cf. with the analogous formula for the elastic materials given is *E*/*c*2 = *k*). In fluids, however, there are also the effects of viscosity, which gives an additional stress, which is proportional not to strain, but to the rate of strain change in time ~*d*/*dt*. Thus, a more general equation relates a pressure and a strain:



where **is the molecular viscosity of a fluid.

Assuming that *p* is constant, find the relaxation time for the strain as described by this equation and the equilibrium state for the strain.

Hint. The relaxation time is defined as the time when the quantity of interest decays with time in the typical degree. For example, if the quantity is described by exponential function exp (–*t* /*T*), then the relaxation time *T* is the time when the quantity decay’s in *e* times.