TA: Tomoyuki Nakayama Monday, November 15, 2010

PHY 2048: Physic 1, Discussion Section 3885
Quiz 10 (Homework Set #12)

Name: **UFID:**

Formula sheets are not allowed. Calculators are allowed. Do not store equations in your calculator. You need to show all of your work for full credit.

Water is pumped steadily out of a flooded basement at a speed of 6.00 m/s through a uniform hose of radius 0.800 cm. The hose passes out through a window to a street ditch 2.50 m above the waterline.

a) What is the mass of the water pumped out from the basement in one second?

During time interval Δt, the water moves $\Delta x = v\Delta t$ in the hose. The mass of water flowing out of the hose in Δt is
$\Delta m = \rho \Delta V = \rho(\pi r^2)v\Delta t$
Therefore, the mass of the water pumped out in one second is
$\Delta m/\Delta t = \rho(\pi r^2)v = 1.21$ *kg*

b) What is the power of the pump?

The power of the pump is defined as the work done by the pump in a unit time. The work energy yields
$P = W/\Delta t = (\Delta K + \Delta U)/\Delta t = (1/2)(\Delta m/\Delta t)v^2 + (\Delta m/\Delta t)gh = 51.4$ *W*