

Math 101 – WORKSHEET 10
WORK, AVERAGE VALUE

(1) (Work)

(a) (Final, 2012) A tank in the shape of a hemispherical bowl of radius $R = 3\text{m}$ is full of water. It is to be emptied through an outlet extending $H = 2\text{m}$ above its top. Using the values $\rho = 1000\text{kg/m}^3$ for the density of water and $g = 9.8\text{m/s}^2$ for the acceleration due to gravity, find the work (in Joules) required to empty the tank completely. There is no need to simplify your answer but you must evaluate all integrals.

(b) (Final, 2013) A force of 10N (Newtons) is required to hold a spring stretched 5 cm beyond its natural length. How much work, in joules (J), is done in stretching the spring from its natural length to 50 cm beyond its natural length?