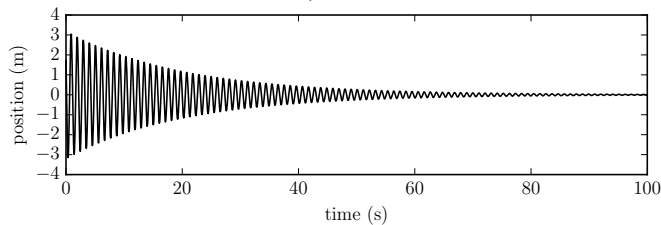


Name: \_\_\_\_\_ NetID: \_\_\_\_\_

## NYU Physics I—Term Exam 4

**Problem 1:** Roughly what is the quality factor  $Q$  of this oscillator? (From Lecture on 2016-10-25.)



**Problem 2:** Consider an ice cube that is 2 cm on a side, floating in water, in normal New York circumstances. Roughly what is the atmospheric pressure force (in force units) acting on the top face of this cube? (From Lecture on 2016-11-01.)

**Problem 3:** A typical adult is holding her or his left arm at a right angle, so the upper arm is pointing straight down, and the forearm is pointing horizontally forwards. The hand is oriented palm-up. The arm is holding a heavy grocery bag by its handle in the hand. Draw a free-body diagram for the hand-plus-forearm system, identifying all significant forces acting on it. (From Problem Set 7.)

**Problem 4:** A modulus  $E$  is a stress divided by a strain. What are the units of  $E$ ? (From Problem Set 8.)

**Problem 5:** A mass  $M$  attached to a spring of spring constant  $k$  is released from rest a distance  $X$  from its equilibrium position. It oscillates with amplitude  $X$ . What is the maximum *kinetic energy*  $K_{\max}$  that this mass ever attains in the future? Assume there is no damping and it just oscillates. Give your answer in terms of  $M$ ,  $k$ , and  $X$  (or any subset of these). (From the recitation on oscillations.)

**Problem 6:** If you have a potential of the form

$$U(x) = Ax^2 + Bx + C$$

where  $A$  and  $B$  are constants, where is the equilibrium position  $x_{\text{eq}}$ ? (From the recitation on potentials.)