Physics 220A Sample Midterm One Fall 2004
October 6, 2004

Name________________________ Also write name on reverse side

1. A dog initially running at constant speed of 9.0 m/s decelerates to a stop in 5.5 meters.
   a. How long does it take the dog to decelerate from maximum speed to rest?

   b. What is her rate of deceleration during this time?

2. A frog is launched from flat ground toward a wall, 55.0 meters distant, with an initial speed of 29.0 m/s at an angle of 33.0 degrees above the horizontal.
   a. Find the x and y components of the initial velocity vector.

   b. How long is the frog in the air?

   c. If the frog strikes the wall, how far up the wall does the frog splat? If not, how close to the wall does the frog land?
3a. A car travels the bottom of a rounded valley. Draw a free body
diagram of the car at the bottom of the valley. Indicate the direction of
the acceleration vector. Is there a maximum or a minimum speed the car
must travel? If so, why?

3b. A 5.0 kg bat strikes a 0.30 kg ball for a very short time $\Delta t$. During
this time, the bat exerts an average force of 31.4 Newtons on the ball. How
much force does the ball exert on the bat?
(a) Exactly 31.4 Newtons
(b) About 520 Newtons
(c) Unknown, but less than 31.4 Newtons.
(d) Unknown, but much more than 520 Newtons.
(e) Depends on $\Delta t$.

4. A 5.2 kg mass is sliding up an inclined plane, inclined at angle $\theta = 36^\circ$
above the horizontal. It is attached by an ideal string over an ideal pulley
to a second mass, 3.1 kg, hanging off the top of the inclined plane, as
shown. If the hanging mass is moving upward (initially) find the
acceleration of the system given the coefficient of kinetic friction between
the 5.2 kg mass and the plane is 0.41.