Physics 115 – Section 0101
Homework #10
Due April 30, 2008

Essay 1, 20 points

For each of the following, say whether the object has acceleration or not. Justify your answer. If the object sometimes accelerates, sometimes does not, under what circumstances does each occur? Your answer should cover for all realistic situations. Can you identify what the reasons might be for the object to experience an acceleration?

a) a car driving on route 95 between DC and Baltimore

b) a runner running the 50 yard dash

c) a hockey puck sliding across ice

d) a ball dropped from the top of a building

Problem 1, 30 points

Our good old friends: The hare and The Tortoise
The Hare and the Tortoise start a 500 m race. Both start from rest. The tortoise takes 2 minutes to come to its maximum velocity, at which point it is 100 m from the start point, and continues at that speed for the rest of the journey which lasts a total of 10 minutes. The hare jumps to a start, reaches a constant velocity in 30 seconds (at which point it is 100 m from the start), reaches the 400 m mark after 2 minutes & 30 seconds (from the start of the journey). It then decides to take a nap for some time. It wakes up with a start after a 7 minute 25 second nap to see the tortoise ahead. So it starts picks up speed in an effort to beat the tortoise, but falls short by 25 m and loses the race to the tortoise.

A. On a graph paper, plot the distance Vs. time graph for the hare and the tortoise (on the same plot). Label each point carefully. Explain the shape of *each section* of the graph. (15 points).
B. On another plot which is directly below the first one, draw the velocity time graph of the hare and the tortoise. You have enough information given to calculate all velocities. Using the slope as a tool, explain how the velocity time graph is consistent with the distance time graph.