Physics 200 **Problem set #2**

Unpleasant Awakening

1. Digipen Dan stares in confusion at his computer monitor for 3 minutes. From t = 3 to 5 minutes, he walks to the other end of Digipen with a constant speed of 2 m/s. From t = 5 to 6 minutes, he begins to scream hysterically and cavorts madly back to his computer at a constant speed of 4 m/s. What are his average velocities over the following time intervals:

a) t = 2 to t = 4 minutes?
b) t = 0 to t = 5 minutes?
c) t = 0 to t = 6 minutes?
d) t = 3 to t = 6 minutes?

2. Digipen Dan ends up at a long, frictionless desk, upon which he places his monitor and shoves. If the desk is 2 m long, and he accelerates the monitor with an acceleration of a = 4 m/s^2:

a) How long does it take for the monitor to reach the end of the desk?
b) How fast is it going when it gets to the end of the desk?

3. The monitor smashes through a window and plummets to the ground 8 m below. There is no acceleration in the x direction, and the window does not slow down the monitor at all. Gravity accelerates the monitor at 10.0 m/s^2 downward.

a) How long does it take for the monitor to reach the ground?
b) How far away from the window does the monitor impact?
c) What is the velocity of the monitor on impact?
d) What is the speed of the monitor on impact?

4. The Evil Physics Monkey is enraged by the implosion of the monitor's vacuum tube, and charges Digipen Dan, scimitar in hand. In the ensuing fracas, the student and monkey end up in the middle of the 2 m long table. The physics monkey pushes with his long monkey-arms, applying a constant acceleration of 2 m/s^2 to DigiPen Dan, and 3.2 m/s^2 to himself (in opposite directions).

a) How long will it take the Dan to fall off the table?
b) How long will it take the monkey to fly off the table?
c) What speeds are the monkey and Dan moving at when they leave the table?

Non-sequitor

5. A Dwarven warrior standing on the ground hurls an axe with an initial velocity of 110 feet per second in a direction 60 degrees above the horizontal. The warrior is aiming at a dragon hovering a height 'h' above the ground. The axe strikes the dragon 5.5 seconds after the warrior's throw (neglect the height of the short warrior).

a) Find the height h at which the dragon is hovering.
b) Find the speed of the axe just before it hits the dragon.
c) Find the maximum height the axe reaches (or would reach if there were no dragon).