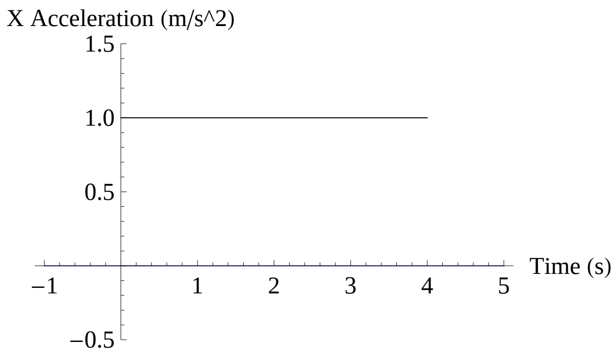
PHYS 211 Homework Assignment

Chapter 3

Problem 1 A softball player hits a line drive to the outfield and starts running towards first base. Draw a graph to illustrate her position and velocity during the first few seconds of her run.

Problem 2 The graph below shows the acceleration in the x direction of an object as a function of time.



(a) Draw a graph of the x velocity of this object. (assume that the velocity is 0 m/s at $t = 0$ s)

(b) Draw a graph of the x position of this object. (assume the initial position is $x_i = 0$ m)

Problem 3 You throw an apple straight up into the air. At each of the following moments decide whether the acceleration of the apple is less than, greater than, or equal to g. Explain.

(a) Just after leaving your hand.

(b) At the top of its trajectory (maximum height).

(c) Just before hitting the ground.

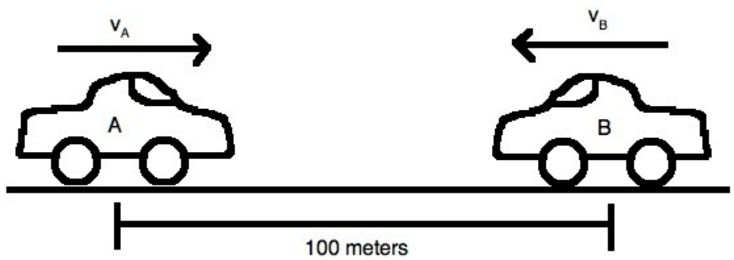
Problem 4 The position of a particle is given by the function $x(t) = 2t^4 + 5t^2 + 6$ meters, where t is in seconds.

(a) What is the function for velocity in the x direction, $v_x(t) =$?

(b) What is the function for the acceleration, $a_x(t) =$?

Problem 5 A villain has stolen a precious treasure, but is near capture. In order to avoid being caught in possession of the treasure he drops it off a 140 meter tall tower. Three seconds after the treasure was dropped, Batman arrives and dives from the top of the building flying towards the ground at 70 m/s to try and save the treasure. Will he be able to catch it before it hits the ground? Show your work.

Problem 6 Imagine two cars heading towards each other, car A and car B (see figure below). Car A is traveling at a *speed* of 30 m/s, and car B is traveling at a *speed* of 25 m/s. When the cars are 100 meters apart, both drivers slam on their brakes. This causes both cars to experience an acceleration of 10 m/s^2 in the direction opposite their movement (they are slowing down).



(a) How far will car A travel before stopping?

(b) How far will car B travel before stopping?

(c) Will there be a collision?

(d) How much time does it take each car to stop?