ECA Physics Homework 1

1. The position function x(t) of a particle moving along an x axis is $x = 4 + 6t^2$, with x in meters and t in seconds. (a) At what time and (b) where does the particle (momentarily) stop? At what (c) negative time and (d) positive time does the particle pass through the origin? or decrease the value of x at which the particle momentarily stops? (e) Graph x versus t for the range -5 s to +5 s.

2. In Fig. 2-24, a red car and a green car, identical except for the color, move toward each other in adjacent lanes and parallel to an x axis. At time $t = 0$, the red car is at $x_r = 0$ and the green car is at $x_g = 220$m. If the red car has a constant velocity of 20 km/h, the cars pass each other at $x = 44.5m$, and if it has a constant velocity of 40 km/h, they pass each other at $x = 76.6m$.What are (a) the initial velocity and (b) the constant acceleration of the green car?

3. A rock is thrown vertically upward from ground level at time $t = 0$. At $t = 1.5s$ it passes the top of a tall tower, and $1.0s$ later it reaches its maximum height. (a)What is the height of the tower? (b) What is the initial speed of projection (c) The maximum height reached by the rock (d) the position of the rock after 3 mins.

4. A plane, diving with constant speed at an angle of 53 degrees with the vertical, releases a projectile at an altitude of 730 m. The projectile hits the ground 5.00 s after release. (a) What is the speed of the plane? (b) How far does the projectile travel horizontally during its flight? What are the (c) horizontal and (d) vertical components of its velocity just before striking the ground?

5. Suppose that a shot putter can put a shot at the worldclass speed 15.00 m/s and at a height of 2.160 m.What horizontal distance would the shot travel if the launch angle is (a) 45 degrees and (b) 42 degrees?