Math 220, Week 5 Tuesday, Section 3.4, 4.2

Spring 2020, XT

3.4 Newtonian Mechanics

1. An object of mass 8 kg is given an upward initial velocity of 20 m/sec and then allowed to fall under influence of gravity. Assume that the force in newtons due to air resistance is $-16v$, where v is the velocity of the object in m/sec. Determine the equation of motion of the object. If the object is initially 100 m above the ground, determine when the object will strike the ground.

4.2 Homogeneous Linear Equations

1. Find a general solution to the differential equations

   (a) $2y'' + 7y' - 4y = 0$

   (b) $4y'' - 4y' + y = 0$

2. Solve the initial value problem

   (a) $y'' - 4y' + 3y = 0; \quad y(0) = 1, \quad y'(0) = 1/3$

   (b) $y'' - 4y' + 4y = 0 \quad y(1) = 1, \quad y'(1) = 1$

3. Determine whether the functions y_1 and y_2 are linearly dependent on $(0, 1)$

   (a) $y_1(t) = \cos t \sin t, \quad y_2(t) = \sin 2t$

   (b) $y_1(t) = 0, \quad y_2(t) = e^t$