

due June 1, 2012 at the beginning of class

Topics covered : equations $y' = ay + b$, where a and b are constant and separable equations (corresponds to sections 1.2, 2.2 in the textbook). *You do not need to use calculator for this assignment.*

1. Assume that the velocity v of the falling object satisfies the following differential equation:

$$v'(t) = 9.8 - \frac{v}{20} \tag{1}$$

- (a) Find a number v_e such that $v(t) \equiv v_e$ is a solution of equation (1) (in other words find the equilibrium solution of (1)).
 - (b) Solve the equation (1) with initial condition $v(0) = 0$. What is the limit of this solution when $t \rightarrow +\infty$? How this limiting velocity is related to your answer in the item (a)?
 - (c) Find the time that must elapse for the object to reach 75% of the limiting velocity found in the item (b).
 - (d) How far does the object fall in the time found in the item (c).
2. Solve the following differential equations (find the general solutions):

$$y' + y^2 \cos x = 0.$$