MATH 286 PROBLEMS DUE JANUARY 31, 2001

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1. Suppose that a sum S_0 is invested at an annual rate of return r compounded continuously.

(a) Find the time T required for the original sum to treble (increase 3 times in value) as a function of r.

(b) Determine T if $r = 7\%$.

(c) Find the return rate that must be achieved if the initial investment is to treble in 8 years.

2. A ball with mass 0.15 kg is thrown upward with initial velocity 25 m/sec from the roof of a building 30 m high. Neglecting air resistance and variation in gravity,

(a) Find the maximum height above the ground that the ball reaches

(b) Assuming that the ball misses the building on the way down, find the time that it hits the ground

(c) Plot the graphs of velocity and position versus time.

3. Find the domain of the solution of

$$(t-4)y' + (\ln t)y = 4t, \quad y(1) = 2.$$

4. Find the region in the (t, y)-plane consisting of points through which there is a unique integral curve of the equation

$$y' = \frac{\ln|ty+1|}{4 - t^2 + y^2}.$$

5. Find the approximate value of $y(3)$ where

$$t_0 = 2, \ y(2) = y_0 = 4,$$

$$y' = 2 + \frac{\cos(t)}{y}$$

by Euler method with step $h = 0.2$. The argument of the cos function is in radians.