Math 220, Week 3 Tuesday, Section 1.4, 2.2

1.4 The Approximation Method of Euler

1. Use Euler's method to approximate the solution to the given initial problem at the points x = 0.1, 0.2, 0.3, 0.4, 0.5, h = 0.1.

$$\frac{dy}{dx} = \frac{x}{y}, \quad y(0) = -1$$

2. Given the Initial Value Problem

$$y' = x - y, \qquad y(0) = 0$$

The actual solution is $y = e^{-x} + x - 1$. Find a value of h for Euler's method such that y(1) is approximated to within ± 0.01 .

Also find, to within ± 0.05 , the value of x_0 such that $y(x_0) = 0.2$.

2.2 Separable Equation

1. Solve the equation

(a)
$$\frac{dx}{dt} = \frac{t}{xe^{t+2x}}$$

2. Solve the initial value problem

(a)
$$\frac{1}{2}\frac{dy}{dx} = \sqrt{y+1}\cos x, \qquad y(\pi) = 0$$

(b)
$$x^2 dx + 2y dy = 0$$
, $y(0) = 2$