### 1.4 The Approximation Method of Euler

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

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

2. Given the Initial Value Problem

$$
y^{\prime}=x-y, \quad y(0)=0
$$

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 $\pm 0.01$.

Also find, to within $\pm 0.05$, the value of $x_{0}$ such that $y\left(x_{0}\right)=0.2$.

### 2.2 Separable Equation

1. Solve the equation
(a) $\frac{d x}{d t}=\frac{t}{x e^{t+2 x}}$
2. Solve the initial value problem
(a) $\frac{1}{2} \frac{d y}{d x}=\sqrt{y+1} \cos x, \quad y(\pi)=0$
(b) $x^{2} d x+2 y d y=0, \quad y(0)=2$
