SAT PREP

EULER 'S

1. Given the differential equation $\frac{dy}{dx} = x + 2$ and y(0) = 3. Find an approximation for y (1) by using Euler's method with two equal steps.

2. Given the differential equation $\frac{dy}{dx} = \frac{1}{x+2}$ find an approximation of y (1) using Euler's Method with two steps and step size $\Delta x = 0.5$.

3. The curve passing through (2,0) satisfies the differential equation $\frac{dy}{dx} = 4x + y$

Find an approximation to y (3) using Euler's Method with two equal steps.

4. Let y = f (x) be the particular solution to the differential equation $\frac{dy}{dx} = x + 2y$ with the initial condition f (0) =1. Use Euler's Method, starting at x = 0 with two steps of equal size to approximate f (−0.6).

5. Given that $\frac{\mathrm{d}y}{\mathrm{d}x} = \frac{y+2}{xy+1}$ and $y = 1$ when $x = 0$, use Euler's method with interval h = 05. to find an approximate value of y when $x = 1$.

6. Consider the differential equation $\frac{\mathrm{d}y}{\mathrm{d}x} - 2y = \sin x$ with boundary condition $y = 1$ when $x = 0$.

Use four steps of Euler's method starting at $x = 0$, with interval $h = 0.1$, to find an approximate value for y when $x = 0.4$.

7. A curve that passes through the point (1, 2) is defined by the differential equation

$$\frac{dy}{dx} = 2x\left(1 + x^2 - y\right).$$

Use Euler's method to get an approximate value of y when $x = 1.3$, taking steps of 0.1. Show intermediate steps to four decimal places in a table.

8. Consider the differential equation $\frac{dy}{dx} + (2x - 1)y = 0$ given that $y = 2$ when $x = 0$.

Use Euler's method with a step value of 0.1 to obtain a second approximation for the maximum value of y. Set out your solution in tabular form.