

Final Exam Preparation Questions

1. Root Finding:

(a) Find the root of the following function using the Bisection and Newton-Raphson methods. Perform 5 iterations for each method.

$$f(x) = e^{\sin(x)} - x$$

(b) Find the root of the following function using the Bisection and Newton-Raphson methods. Perform 5 iterations for each method.

$$f(x) = \cos(\sqrt{x})$$

2. Numerical Integration:

(a) Find the area under the curve using the given dataset. Use suitable numerical techniques.

x	$f(x)$
0	2.53
0.5	1.97
1	3.15
1.5	3.92
2	4.15
2.5	4.98
3	6.37
3.5	7.13

(b) Find the area under the curve using the given dataset. Use suitable numerical techniques.

x	$f(x)$
0	12.53
0.5	11.97
1	13.15
1.5	13.92
2	17.17
2.5	23.98
3	26.73
3.5	33.13

3. Solving Ordinary Differential Equations:

Solve the following ODE using Euler's method:

$$\frac{dy}{dx} = (x + y)^2$$

with the initial condition:

$$y(0) = 1$$