Theoretical Models for Computing

Lab #4

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1. Develop a program to implement the Newton's method. Design the program so that it is expressly designed to locate a maximum. The subroutine should have the following features:

• Iterate until the relative error falls below a stopping criterion or exceeds a maximum number of iterations.

• Return both the optimal x and f (x).

Test your program with the formula

$$f(x) = -x^2 + 8x - 12$$

2. Develop a program to implement the random search method. Design the subprogram so that it is expressly designed to locate a maximum. Test the program with f (x, y) from

$$f(x,y) = 3.5x + 2y + x^2 - x^4 - 2xy - y^2$$

Use a range of −2 to 2 for both x and y.