## NUMERICAL OPTIMISATION ASSIGNMENT 0: EXAMPLE

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## EXERCISE 1.

(a) Write a Matlab function that implements the Rosenbrock function

$$f(x,y) = 100(y - x^2)^2 + (1 - x)^2.$$

Be careful to implement a function that can be evaluated at many points simultaneously.

Submit your implementation via Cody Coursework.

- (b) Create a two dimensional grid using Matlab's command meshgrid. Plot f using your implemented Matlab's function of the grid. Check out the following functions: surf (use option 'EdgeColor' = 'none' when using many grid points), surfc, contour, contourf. Can you see the minimiser? Can you use some transformation to highlight the minimiser?//powcoder.com
- (c) Calculate the gradient  $\nabla f$  and the Hessian  $\nabla^2 f$ .

  Submit your so Atio Chat powcoder
- (d) Find the minimiser  $x^*$  of the function f. Show that  $x^*$  is unique and that  $\nabla^2 f(x^*)$  is positive definite.
  - $Submit\ your\ solution\ via\ {\it Turnitin}.$
- (e) Compute the gradient  $\nabla f$  and the Hessian  $\nabla^2 f$  numerically using finite differences. Check out the functions gradient, diff, and implement finite differences as a matrix multiplication.

Submit your solution via Turnitin.

<u>Remark</u>. The submission to Turnitin should not be longer than 2 pages. Avoid submitting more code than needed (if any) and focus on explaining your results.