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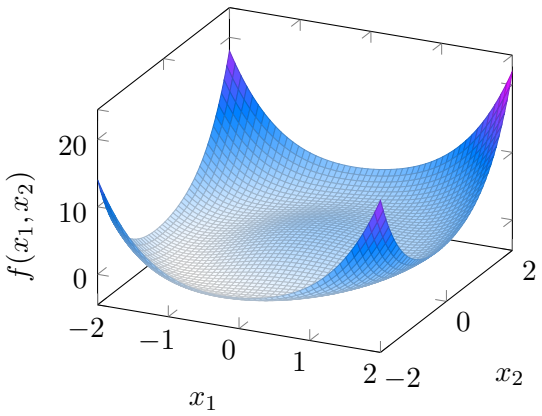
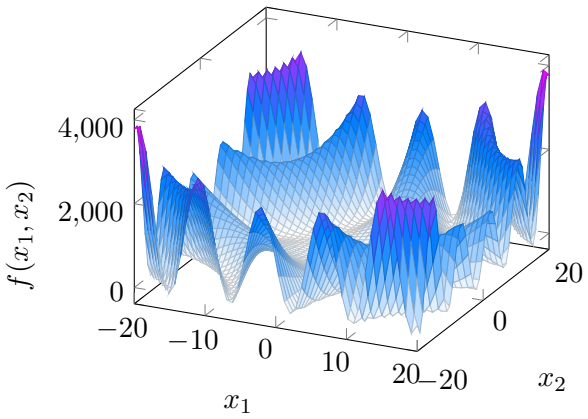
CK0031/CK0248: Homework 03

Exercise 1. Consider the objective functions

$$f(\mathbf{x}) = x_1 + x_2 + 0.5(x_1^2 + x_2^2 - 2)^2$$



$$f(\mathbf{x}) = [\sin(\frac{2}{3}\pi x_1 x_2 + 1)](2x_1^2 + 3x_2^2 + 4)$$



1. Compute expression s for the gradient vector $\nabla f(\mathbf{x})$ and the Hessian matrix $\nabla^2 f(\mathbf{x})$
2. Write code to implement two line-search method to minimise $f(\mathbf{x})$

$$\mathbf{x}^{(k+1)} = \mathbf{x}^{(k)} + \alpha_k \mathbf{d}^{(k)}, \quad \text{with } \mathbf{d}^k = \begin{cases} -[\nabla f(\mathbf{x}^{(k)})] \\ -[\nabla^2(\mathbf{x}^k)^{-1} \end{cases}$$

Test with fixed values of α_k and different initial solutions $\mathbf{x}^{(0)}$