

CSE-5368-001 Neural Networks
Spring 2023 Quiz 05

Time: 12 Minutes

Consider the following performance surface:

$$F(\mathbf{X}) = x_1 x_2^3 + 3x_2$$

Find the second order Taylor series expansion of this function around point $\mathbf{x}^* = \begin{bmatrix} 4 \\ 2 \end{bmatrix}$

You **MUST SHOW** your results in the **EXPANDED** form, i.e. , a **polynomial consisting of x_1 and x_2**

Hint: $F(\mathbf{x}) \cong F(\mathbf{x}^*) + \nabla F(\mathbf{x})^T |_{\mathbf{x}=\mathbf{x}^*} (\mathbf{X} - \mathbf{x}^*) + \frac{1}{2} (\mathbf{X} - \mathbf{x}^*)^T \nabla^2 F(\mathbf{x}) |_{\mathbf{x}=\mathbf{x}^*} (\mathbf{X} - \mathbf{x}^*)$