Time: 12 Minutes

Consider the following performance surface:

$$F(X) = x_1 x_2^3 - 16x_2$$

Find the second order Taylor series expansion of this function around point $X^* = \begin{bmatrix} 3 \\ 2 \end{bmatrix}$

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

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