Cmpt 898 Asn 2, Question 3

For the expression: $y = x^2 + 2x + 3$

Where x^2 denotes $x \odot x$

$$\nabla y = \left[\partial f / \partial x \right] = \left[2x + 2 + C \right] = \left[2x + 2 \right]$$

for test vector $x_1 = \begin{pmatrix} 2 \\ 4 \end{pmatrix}$

$$\nabla y(x_1) = \begin{pmatrix} (2)x_{11} + 2 \\ (2)x_{21} + 2 \end{pmatrix} = \begin{pmatrix} (2)(2) + 2 \\ (2)(4) + 2 \end{pmatrix} = \begin{pmatrix} 6 \\ 10 \end{pmatrix}$$

for test vector $x_2 = \begin{pmatrix} 0.5 \\ 10 \\ 4 \\ 8 \end{pmatrix}$

$$\nabla y(x_2) = \begin{pmatrix} (2)x_{11} + 2 \\ (2)x_{21} + 2 \\ (2)x_{31} + 2 \\ (2)x_{41} + 2 \end{pmatrix} = \begin{pmatrix} (2)(0.5) + 2 \\ (2)(10) + 2 \\ (2)(4) + 2 \\ (2)(8) + 2 \end{pmatrix} = \begin{pmatrix} 3 \\ 22 \\ 10 \\ 18 \end{pmatrix}$$