Serie 2

1. a) $Df(\vec{x}) = \begin{vmatrix} 5x_2 & 5x_1 \\ 2x_2^2x_1+1 & 2x_1^2x_2+2 \end{vmatrix}$

$f(\vec{x}_0) = \begin{pmatrix} 10 \\ 9 \end{pmatrix}$ $\qquad Df(\vec{x}_0) = \begin{vmatrix} 10 & 5 \\ 9 & 6 \end{vmatrix}$

$g(\vec{x}) = \begin{pmatrix} 10 \\ 9 \end{pmatrix} + \begin{vmatrix} 10 & 5 \\ 9 & 6 \end{vmatrix} \cdot \begin{vmatrix} x_1-1 \\ x_2-2 \end{vmatrix}$

$= \begin{pmatrix} 10 \\ 9 \end{pmatrix} + \begin{vmatrix} 10(x_1-1) & 5(x_2-2) \\ 9(x_1-1) & 6(x_2-2) \end{vmatrix}$

$= \begin{pmatrix} 10 \\ 9 \end{pmatrix} + \begin{vmatrix} (10x_1-10)+(5x_2-10) \\ (9x_1-9)+(6x_2-12) \end{vmatrix}$

$= \begin{vmatrix} 10x_1+5x_2-10 \\ 9x_1+6x_2-12 \end{vmatrix}$

b)

$f(\vec{x}_0) = \begin{vmatrix} \ln(5)+9 \\ \exp(13)+1 \\ \frac{3}{10}+4 \end{vmatrix}$

$Df(x) = \begin{vmatrix} \frac{2x_1}{(2x_1+x_2^2)} & \frac{2x_2}{(x_1^2+x_2^2)} & 2x_3 \\ 2x_1 & 2x_2 \cdot \exp(x_2^2+x_3^2) & 2x_3 \cdot \exp(x_2^2+x_3^2) \\ \frac{-2x_1}{(2x_1^2+x_3^2)^2} & 2x_2 & \frac{-2x_3}{(x_1^2+x_3^2)^2} \end{vmatrix}$

$Df(\vec{x}_0) = \begin{vmatrix} \frac{2}{5} & \frac{4}{5} & 6 \\ 2 & 4e^{13} & 6e^{13} \\ \frac{-1}{50} & 4 & \frac{-3}{50} \end{vmatrix}$

$g(\vec{x}_0) = \begin{vmatrix} \frac{2x_1}{5} + \frac{4x_2}{5} + 6x_3 & -9.391 \\ 2x_1 + 4e^{13}(x_2-2) + 6e^{13}(x_3-3) & +44241,3920 \\ \frac{-x_1}{50} + 4x^2 + \frac{3x_3}{50} & -3.7 \end{vmatrix}$