Your grade: 100%

Your latest: **100%** • Your highest: **100%** • To pass you need at least 80%. We keep your highest score.

Next item →

1. In this quiz, you will calculate the Hessian for some functions of 2 variables and functions of 3 variables.

1 / 1 point

For the function $f(x, y) = x^3y + x + 2y$, calculate the Hessian matrix $H = \begin{bmatrix} \partial_{x,x}f & \partial_{x,y}f \\ \partial_{y,x}f & \partial_{y,y}f \end{bmatrix}$

- ( ) $H = \begin{bmatrix} 6xy & -3x^2 \\ -3x^2 & 0 \end{bmatrix}$
- ( ) $H = \begin{bmatrix} 0 & 3x^2 \\ 3x^2 & 6xy \end{bmatrix}$
- (•) $H = \begin{bmatrix} 6xy & 3x^2 \\ 3x^2 & 0 \end{bmatrix}$
- ( ) $H = \begin{bmatrix} 0 & -3x^2 \\ -3x^2 & 6xy \end{bmatrix}$

Correct
Well done!

2. For the function $f(x, y) = e^x cos(y)$, calculate the Hessian matrix.

1 / 1 point

- (•) $H = \begin{bmatrix} e^x cos(y) & -e^x sin(y) \\ -e^x sin(y) & -e^x cos(y) \end{bmatrix}$
- ( ) $H = \begin{bmatrix} -e^x cos(y) & -e^x sin(y) \\ e^x sin(y) & -e^x cos(y) \end{bmatrix}$
- ( ) $H = \begin{bmatrix} -e^x cos(y) & -e^x sin(y) \\ -e^x sin(y) & e^x cos(y) \end{bmatrix}$
- ( ) $H = \begin{bmatrix} -e^x cos(y) & e^x sin(y) \\ -e^x sin(y) & -e^x cos(y) \end{bmatrix}$

Correct
Well done!

3. For the function $f(x,y)=\frac{x^2}{2}+xy+\frac{y^2}{2}$, calculate the Hessian matrix.

1 / 1 point

Notice something interesting when you calculate $\frac{1}{2}[x,y]H\begin{bmatrix}x\\y\end{bmatrix}$!

- (selected) $H=\begin{bmatrix}1 & 1\\1 & 1\end{bmatrix}$
- $H=\begin{bmatrix}1 & 0\\0 & 1\end{bmatrix}$
- $H=\begin{bmatrix}1 & 0\\-1 & 1\end{bmatrix}$
- $H=\begin{bmatrix}1 & -1\\-1 & 1\end{bmatrix}$

Correct
Well done! Not unlike a previous question with the Jacobian of linear functions, the Hessian can be used to succinctly write a quadratic equation in multiple variables.

4. For the function $f(x,y,z)=x^2e^{-y}cos(z)$, calculate the Hessian matrix

1 / 1 point

$$H=\begin{bmatrix}\partial_{x,x}f & \partial_{x,y}f & \partial_{x,z}f\\ \partial_{y,x}f & \partial_{y,y}f & \partial_{y,z}f\\ \partial_{z,x}f & \partial_{z,y}f & \partial_{z,z}f\end{bmatrix}$$

- $H=\begin{bmatrix}2xe^{-y}cos(z) & -2e^{-y}cos(z) & -2e^{-y}sin(z)\\ -2e^{-y}cos(z) & x^2e^{-y}cos(z) & x^2e^{-y}sin(z)\\ -2x^2e^{-y}sin(z) & x^2e^{-y}sin(z) & -2xe^{-y}cos(z)\end{bmatrix}$
- (selected) $H=\begin{bmatrix}2e^{-y}cos(z) & -2xe^{-y}cos(z) & -2xe^{-y}sin(z)\\ -2xe^{-y}cos(z) & x^2e^{-y}cos(z) & x^2e^{-y}sin(z)\\ -2xe^{-y}sin(z) & x^2e^{-y}sin(z) & -x^2e^{-y}cos(z)\end{bmatrix}$
- $H=\begin{bmatrix}2xe^{-y}cos(z) & x^2e^{-y}cos(z) & 2xe^{-y}sin(z)\\ 2xe^{-y}cos(z) & x^2e^{-y}cos(z) & x^2xe^{-y}sin(z)\\ 2xe^{-y}sin(z) & 2xe^{-y}sin(z) & 2xe^{-y}cos(z)\end{bmatrix}$
- $H=\begin{bmatrix}2e^{-y}cos(z) & 2xe^{-y}cos(z) & 2xe^{-y}sin(z)\\ 2xe^{-y}cos(z) & x^2e^{-y}cos(z) & x^2e^{-y}sin(z)\\ 2xe^{-y}sin(z) & x^2e^{-y}sin(z) & x^2e^{-y}cos(z)\end{bmatrix}$

Correct
Well done!

5. For the function $f(x,y,z)=xe^y+y^2cos(z)$, calculate the Hessian matrix.

1 / 1 point

- $\begin{bmatrix}0 & e^y & 0 \end{bmatrix}$

5. For the function $f(x, y, z) = xe^y + y^2 cos(z)$, calculate the Hessian matrix.

1 / 1 point

- [ ] $H = \begin{bmatrix} 0 & e^y & 0 \\ e^y & xe^y + 2sin(z) & 2ycos(z) \\ 0 & 2ycos(z) & y^2 sin(z) \end{bmatrix}$
- [ ] $H = \begin{bmatrix} 0 & e^y & 0 \\ e^y & xe^y + 2cos(z) & 2ysin(z) \\ 0 & 2ysin(z) & y^2 cos(z) \end{bmatrix}$
- [x] $H = \begin{bmatrix} 0 & e^y & 0 \\ e^y & xe^y + 2cos(z) & -2ysin(z) \\ 0 & -2ysin(z) & -y^2 cos(z) \end{bmatrix}$
- [ ] $H = \begin{bmatrix} 0 & e^y & 0 \\ e^y & xe^y + 2sin(z) & -2ycos(z) \\ 0 & -2ycos(z) & -y^2 sin(z) \end{bmatrix}$

Correct

Well done!