Assessment: Jacobians and Hessians

5/5 points (100%)

Quiz, 5 questions

✔ **Congratulations! You passed!**

| Next Item |

✔ 1 / 1
points

1.

In this assessment, you will be tested on all of the different topics you have in covered this module. Good luck!

Calculate the Jacobian of the function $f(x, y, z) = x^2 cos(y) + e^z sin(y)$ and evaluate at the point $(x, y, z) = (\pi, \pi, 1)$.

○ $J(x, y, z) = (-2\pi, e, 1)$

○ $J(x, y, z) = (-2\pi, e, 0)$

○ $J(x, y, z) = (-2\pi, -e, 1)$

◉ $J(x, y, z) = (-2\pi, -e, 0)$

Correct
Well done!

✔ 1 / 1
points

2.

Calculate the Jacobian of the vector valued functions:

$u(x, y) = x^2 y - cos(x) sin(y)$ and $v(x, y) = e^{x+y}$ and evaluate at the point $(0, \pi)$.

○ $\begin{bmatrix} 0 & 1 \\ e^\pi & e^\pi \end{bmatrix}$

Correct

Assessment: Jacobians and Hessians   **5/5 points (100%)**

Quiz, 5 questions

○ $\begin{bmatrix} e^\pi & 1 \\ e^\pi & 0 \end{bmatrix}$

○ $\begin{bmatrix} 0 & e^\pi \\ 1 & e^\pi \end{bmatrix}$

○ $\begin{bmatrix} e^\pi & 1 \\ 0 & e^\pi \end{bmatrix}$

✔ **1 / 1 points**

3.

Calculate the Hessian for the function $f(x,y) = x^3 \cos(y) - x\sin(y)$.

○ $H = \begin{bmatrix} 6\cos(y) & -3x^2\sin(y) - \cos(y^2) \\ -3x^2\sin(y) - \cos(y) & x^2\sin(y) - x^3\cos(y) \end{bmatrix}$

◉ $H = \begin{bmatrix} 6x\cos(y) & -3x^2\sin(y) - \cos(y) \\ -3x^2\sin(y) - \cos(y) & x\sin(y) - x^3\cos(y) \end{bmatrix}$

▲

Correct

Well done!

○ $H = \begin{bmatrix} 6\cos(x) & -3x^2\sin(y) - \cos(y) \\ -3x^2\sin(y) - \cos(y) & x\sin(y) - y^3\cos(x) \end{bmatrix}$

○ $H = \begin{bmatrix} 6x^2\cos(y) & -3x^2\sin(y) - \cos(x) \\ -3x^2\sin(y) - \cos(y) & x\sin(y) - x\cos(y) \end{bmatrix}$

✔ **1 / 1 points**

4.

Calculate the Hessian for the function
$f(x,y,z) = xy + \sin(y)\sin(z) + z^3 e^x$.

◉ $H = \begin{bmatrix} e^x z^3 & 1 & 3e^x z^2 \\ 1 & -\sin(y)\sin(z) & \cos(y)\cos(z) \\ 3e^x z^2 & \cos(y)\cos(z) & 6e^x z - \sin(y)\sin(z) \end{bmatrix}$

▲

Correct
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Quiz, 5 questions

○ $H = \begin{bmatrix} -e^x z^3 & 0 & 3e^y z^2 \\ 1 & sin(y)sin(z) & cos(y)cos(z) \\ 3e^x z & cos(y)cos(z) & 6e^{-xz} - sin(y)sin(z) \end{bmatrix}$

○ $H = \begin{bmatrix} 3e^x z^2 & -1 & 3e^x z \\ 1 & -sin(x^2)sin(z) & cos(y)cos(z) \\ 3e^x z & cos(y)cos(z) & 6e^y z2 - sin(y)sin(z) \end{bmatrix}$

○ $H = \begin{bmatrix} 2e^x z^3 & 1 & e^x z^2 \\ 0 & -sin(x)sin(z) & cos(y)cos(z) \\ 3e^x z^2 & cos(y)cos(z) & 6e^{2x} - sin(y)sin(x) \end{bmatrix}$

✔️   1 / 1
       points

5.

Calculate the Hessian for the function
$f(x, y, z) = xycos(z) - sin(x)e^y z^3$ and evaluate at the point
$(x, y, z) = (0, 0, 0)$

○ $H = \begin{bmatrix} 0 & 0 & 0 \\ 1 & 0 & 1 \\ 0 & 0 & 0 \end{bmatrix}$

○ $H = \begin{bmatrix} 0 & 0 & 0 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}$

◉ $H = \begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$

Correct
Well done!

○ $H = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}$

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