

Assessment: Jacobians and Hessians

LATEST SUBMISSION GRADE
100%

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

1 / 1 point

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

- ☒ $J(x, y, z) = (-2\pi, -e, 0)$
- ☐ $J(x, y, z) = (-2\pi, e, 0)$
- ☐ $J(x, y, z) = (-2\pi, e, 1)$
- ☐ $J(x, y, z) = (-2\pi, -e, 1)$

✓ **Correct**
Well done!

2. Calculate the jacobian of the vector valued functions:

1 / 1 point

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

- ☐ $\begin{bmatrix} e^\pi & 1 \\ e^\pi & 0 \end{bmatrix}$
- ☐ $\begin{bmatrix} 0 & e^\pi \\ 1 & e^\pi \end{bmatrix}$
- ☒ $\begin{bmatrix} 0 & 1 \\ e^\pi & e^\pi \end{bmatrix}$
- ☐ $\begin{bmatrix} e^\pi & 1 \\ 0 & e^\pi \end{bmatrix}$

✓ **Correct**
Well done!

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

1 / 1 point

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

✓ **Correct**
Well done!

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

1 / 1 point

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

✓ **Correct**
Well done!

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

1 / 1 point

- ☐ $H = \begin{bmatrix} 0 & 0 & 0 \\ 1 & 0 & 1 \\ 0 & 0 & 0 \end{bmatrix}$
- ☒ $H = \begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$
- ☐ $H = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}$
- ☐ $H = \begin{bmatrix} 0 & 0 & 0 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}$

✓ **Correct**
Well done!