Practice with partial derivatives

Let \( f(x, y) = xe^{xy} \). Compute \( f_x(1, 2) \).

(a) \( e^2 \)
(b) \( 2e^2 \)
(c) \( 3e^2 \)
(d) \( 4e^2 \)

Correct answer: (c)
Contour graphs and partial derivatives

The following shows the contour graph of a function $f(x, t)$. Here the horizontal axis is the $x$-axis, and the vertical axis is the $t$-axis. The dark colours indicate regions of where $f$ is negative, while the lighter colours indicate regions where $f$ is positive.

What can you say about $f_t$ and $f_{xx}$ at the point $(x, t) = \left( \frac{\pi}{2}, 1.25 \right)$?

- (a) $f_t < 0$, $f_{xx} < 0$
- (b) $f_t > 0$, $f_{xx} = 0$
- (c) $f_t < 0$, $f_{xx} = 0$
- (d) I don’t know.

Correct answer: (a)
When is the first midterm?
(a) Tomorrow (Tuesday, February 5)
(b) Tuesday, February 12
(c) Tuesday, February 19
(d) There are no midterms in this course
Correct answer: (b)

- Official time: 7:15–8:15pm, but please arrive by 7:00pm to find your seat.
- Check the exam webpage to find the location (based on your discussion section).
- If you need to sign up for a conflict exam or DRES accommodations, the deadline to do so is tomorrow, Tuesday 5 February.
Solutions to the heat equation

(Slice at $t = 0$ shows the initial temperature along the rod.)
Consider the function \( f(x, y) = xe^{xy} \). We have

\[
\frac{\partial f}{\partial x}(x, y) = e^{xy} + yxe^{xy}
\]
\[
\frac{\partial f}{\partial y}(x, y) = x^2 e^{xy}.
\]

Use this information to write down the linearization \( L(x, y) \) of \( f(x, y) \) at the point \((1, 0)\). Use \( L \) to approximate the value of \( f(1.1, -0.1) \).

(a) \( f(x, y) \approx 1 \).
(b) \( f(x, y) \approx 0 \).
(c) I cannot do this without a calculator.
(d) I don’t understand the question.

Correct answer: (a)