

## Practice with partial derivatives

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

(a)  $e^2$

(b)  $2e^2$

(c)  $3e^2$

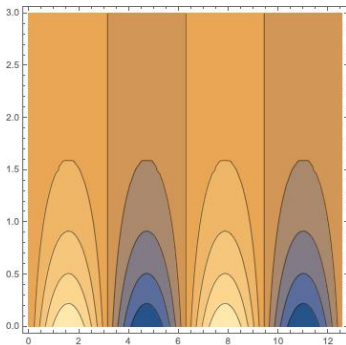
(d)  $4e^2$

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  $(x, t) = (\frac{\pi}{2}, 1.25)$ ?



- (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)

## Midterm 1

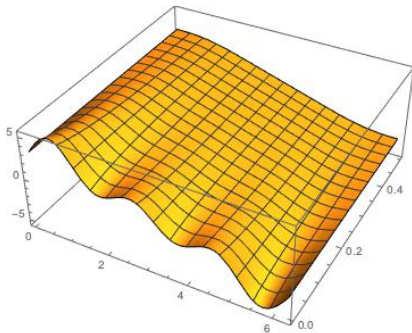
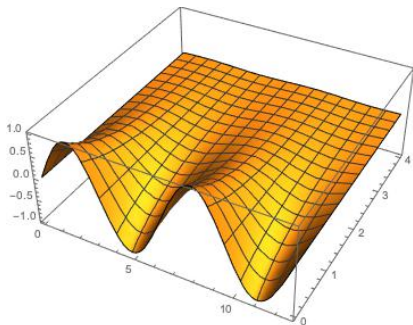
When is the first midterm?

- (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.)

## Linearization and linear approximation

Consider the function  $f(x, y) = xe^{xy}$ . We have

$$\frac{\partial f}{\partial x}(x, y) = e^{xy} + xye^{xy}$$
$$\frac{\partial f}{\partial y}(x, y) = x^2 e^{xy}.$$

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)