

Midterm 2: Frequently Asked Questions

Math 195 Section 91

Wednesday July 15, 2009

What will the exam be like?

The oral exam will last between thirty and **sixty minutes**, and again, will be worth 225 points. If you have not yet emailed me your preferences, please do so today.

During the exam, you will stand at the chalkboard; I will invite you to demonstrate various pieces of mathematics (e.g., “Write down a polynomial; find the partial derivative of it with respect to x ”). As you do so, I will ask additional questions. Ideally, we will complete around six problems together.

Can I use my calculator?

Calculators are **forbidden** but feel free to ask me questions during the oral exam if you get stuck.

What might I have to do on this exam?

I may be asking you to:

- Differentiate a vector-valued function
- Graph a vector-valued function
- Discuss functions of several variables
- Compute a limit of a function of several variables
- Convert a limit in cartesian coordinates to polar coordinates
- Define continuity for functions of several variables
- Give an example of a limit that does not exist
- Compute partial derivatives
- Compute higher partial derivatives
- Give an example in which mixed partials commute
- Describe what a partial derivative is measuring

- Write down a linear approximation to a function
- Find the tangent plane to a function at a point
- **Compute partial derivatives with the chain rule**
- Compute the gradient of a function
- Interpret the gradient as “steepest ascent”
- Compute directional derivatives
- Define global maximum and global minimum
- Define local maximum and local minimum
- Find critical points
- Find maximum and minimum values over a given region
- Apply the second derivative test
- Optimize a function given a constraint with Lagrange multipliers