The final exam is 7-10 pm on December 6, in Kresge Auditorium and Annenberg Auditorium (in the Cummings Art Building); take your pick of location. The exam covers everything in the textbooks that we’ve covered in class:

- Levandosky sections 1–17, 21, 23, and 25

You can expect the final to emphasize the sections not covered on the two midterms (Edwards & Penney sections 13.6–13.9), but you will be tested on all the material in the course! Sample final exams can be found, as usual, on the course web site, but remember not to fret if you don’t recognize some terms, since the course is taught differently from quarter to quarter.

1. Definitions to know

- differential $df$ of a function $f(x, y)$ or $f(x, y, z)$
- derivative matrix $f'(\vec{x})$ (where $f : \mathbb{R}^n \to \mathbb{R}$) or, more generally, the Jacobian $F'(\vec{x})$ (where $F : \mathbb{R}^n \to \mathbb{R}^m$)
- dependent, intermediate, independent variables
- directional derivative $D_{\vec{u}}f(\vec{x})$, gradient $\nabla f(\vec{x})$

2. You should know how to...

- find a linear approximation $f(x + \Delta x, y + \Delta y)$ or $f(x + \Delta x, y + \Delta y, z + \Delta z)$, or even $F(\vec{x} + \vec{h})$, where $F : \mathbb{R}^n \to \mathbb{R}^m$ and $\vec{h}$ is small (use $F(\vec{x} + \vec{h}) \approx F(\vec{x}) + F'(\vec{x})\vec{h}$)
- use the Chain Rule to compute partial derivatives
- find partial derivatives even when the dependent variable is defined implicitly (e.g., given that $f(x, y, z) = 0$, find $\partial z/\partial x$ and $\partial z/\partial y$)
- calculate directional derivatives using the gradient
- using the gradient, deduce the direction in which the function increases most rapidly, and the directional derivative of the function in that direction
- find the normal vector to a surface $F(x, y, z) = c$, or the equation for a tangent plane to that surface, using the gradient
- find possible extrema for a function given one or two constraints, using Lagrange multipliers

Remember also to look at the review sheets for the two midterms. All of these review sheets can be found at http://math.stanford.edu/~lng/. Good luck!