Test One
February 16 2009
February 17 2009

Your name:
Student #:

Important:

✗ Show your work. A sole answer without anything to show that you honestly solve the problem will be graded zero.
✗ You can use a calculator, but only to help you in calculating or checking your work. Simply copying answer from calculator will be considered cheating (for example, input data in the statistic functions of a scientific calculator and copy down the answers).
✗ You can use a print of the on-line lecture note, NOT YOURS, so it can be considered fair for all students. Along with the note, you can also bring a small cheat-sheet (regular size, not an A4 sized one).
✗ I DO give partial credits, at my standard. This means, writing some weird stuff and claim it solved the question doesn't mean you will get some credits. Sometimes I even minus some percentage of your entire work if that is a serious mistake.
✗ I prefer you give answer in rational value or radical form, a decimal answer (like, 2.6458 in stead of $\sqrt{7}$ ) is ugly and in some situation will not be acceptable.
✗ No make-up test !!! except super extraordinary reason.
✗ Don't forget to write your name on the first page of your work, or on this sheet and staple to your papers. Also remember to write your name on the back of the last sheet which helps me in returning your tests later.
You should do all the practice homeworks if you haven't done so. All the test questions are similar to those in lectures and in practice homework, of the same level of difficulty/easiness. Sometimes it is a mix of some problems. I will give hints if necessary. You should try bonus question(s), the extra credit is huge. I also prefer break one question into many small parts to guide students through solving problem.

Topics from where the test problems will be selected:
[1] Unconstrained optimization
the most important steps are: solve \( f_x = f_y = 0 \) then test the candidates using \( D = f_{xx}f_{yy} - (f_{xy})^2 \)

[2] Constrained optimization
setup and solve \( \frac{f_x}{g_x} = \frac{f_y}{g_y} \) and \( g(x, y) = 0 \). Compute the corresponding value for each pair \((x, y)\) found, then take the best answer among them.

[3] Least Square method:
- list the points into the first 2 columns \( x_i, y_i \), compute the averages \( \hat{x}, \hat{y} \)
- fill in the next 2 columns \( x_i - \hat{x}, y_i - \hat{y} \), the name of the columns should already explain itself what to do: subtract the averages from the points co-ordinates.
- in the last two columns, fill in the product of the previous two columns: \( (x_i - \hat{x})(y_i - \hat{y}) \) and the square \( (x_i - \hat{x})^2 \). Add up values in each column, take m to be their ratio (product over square)
- compute b as \( b = \hat{y} - m \hat{x} \)

[4] Integration: power rule (check lecture note)
[5] Integration: substitution
[6] Integration: by parts

There will be one or two bonus question(s), with total 10 points, which can be either:
[a] integration: substitution or by parts.
[b] a random question, which normally doesn't explicitly involve math, purposely created to help you fresh your mind and avoid being too stressed because of the test. Sometimes, though the question, I also want to see how students motivate their thinking to answer such questions, so I can design the homework and test appropriately. Beside, frankly, for some students, these questions sometimes keep them occupied when they finish the test too quickly and want some more challenge.

Last semester, one of the questions was:
What word(s) in English become(s) shorter when you add more letter(s)?