**Final Exam**

**Multivariable Calculus**

Date and Times of the Final:

* 9am class: Thursday from 8 – 9:50am
* 10am class: Wednesday from 10 – 11:50am

Course Objectives: The student will be able to *…*

|  |  |
| --- | --- |
| * calculate partial derivatives using the chain rule.
 | * calculate the gradient and directional derivatives.
 |
| * evaluate multiple integrals using multiple coordinate systems.
 | * evaluate line and surface integrals.
 |
| * apply Green’s Theorem.
 | * apply Stokes’ Theorem.
 |
| * apply the Divergence Theorem.
 | * calculate curl and divergence.
 |

Select comments:

1. The final is cumulative.
2. Regarding length – the test will be between 6 and 10 questions in length.
3. You are permitted a 3x5 note card on the exam. You will be required to turn in the note card with the exam.
4. Non-symbolic graphing calculators are acceptable. Bring your own or borrow one from me.
5. What are the named theorems (someone’s name attached)?
6. The only new material on the final exam is the two sections on Stoke’s Theorem and the Divergence Theorem.
7. Don’t forget your name, the quote, and the warm ups.
8. I have been known to get creative on final exams … giving hints, or having problems tie together. So, make sure you look the exam over in its entirety prior to getting started.
9. Anyone who receives a grade of 70% or better on the exam will receive no lower than a 2.0 GPA in the class (there is hope for everyone).
10. I will post grades in WebAssign when grading is complete, but GPA grades will show up online.
11. I do not give final exams back or post keys. If you want to see your exam, you will have to stop by my office and look at it. This is always a good idea … if only to make sure I counted points correctly.

Item analysis from past exams:

|  |  |  |  |
| --- | --- | --- | --- |
| **Test 1** | **Max Raw Score** | **median %** | **mean %** |
| raw score | 69 | 82.6 | 77.8 |
| warm-ups | 4 | 87.5 | 84.1 |
| partial derivatives | 10 | 100.0 | 90.3 |
| chain rule (less variables) | 5 | 100.0 | 86.5 |
| chain rule (more variables) | 5 | 80.0 | 74.0 |
| implicit differentiation | 5 | 80.0 | 69.0 |
| gradients and directional derivative | 25 | 90.0 | 81.7 |
| contour plots | 10 | 80.0 | 73.8 |
| gradient field application | 5 | 40.0 | 41.0 |
|  |  |  |  |
| **Test 2** | **Max Raw Score** | **median %** | **mean %** |
| raw score | 81 | 80.9 | 76.7 |
| warm-ups | 5 | 100.0 | 86.7 |
| double integral: rectangular | 10 | 100.0 | 92.6 |
| double integral: rectangular to polar coordinates | 10 | 80.0 | 77.9 |
| change of variables (the Jacobian) | 10 | 85.0 | 72.6 |
| centroid | 10 | 50.0 | 52.4 |
| 3D sketch | 10 | 60.0 | 64.3 |
| triple integral: rectangular coordinates setup | 10 | 80.0 | 75.5 |
| triple integral: spherical setup | 10 | 100.0 | 78.6 |
| triple integral: cylindrical to spherical coordinates | 10 | 60.0 | 63.8 |
|  |  |  |  |
| **Test 3** | **Max Raw Score** | **median %** | **mean %** |
| raw score | 64 | 72.7 | 72.9 |
| warm-ups | 4 | 75.0 | 70.1 |
| is a field conservative? | 4 | 75.0 | 71.5 |
| Evaluate a line integral across a conservative field | 10 | 75.0 | 73.1 |
| fundamental theorem of line integrals | 6 | 75.0 | 66.7 |
| Green's theorem | 10 | 80.0 | 79.4 |
| vector field div/curl/conservative | 10 | 90.0 | 87.8 |
| parametrize the paraboloid | 3 | 100.0 | 81.5 |
| surface integral setup | 4 | 75.0 | 68.1 |
| evaluate the surface integral | 3 | 33.3 | 49.1 |
| calculate the flux | 10 | 65.0 | 63.3 |