Math 223

Week 15 Homework due Wednesday, Dec 8, 10:15 AM (Final Exam)

Sections 13.8, 13.9

Section 13.8, problems 1, 7, 9a, 11

Hints:

1. Use the formula on the left-hand side of the boxed equation on page 786. For C, use the boundary of S, which is the circle $x^2 + y^2 = 4$, $z = 0$.

7. Use the formula on the right-hand side of the boxed equation on page 786. Use cylindrical coordinates to parameterize the interior of C in the plane $z = 5$.

9. Use the formula on the right-hand side of the boxed equation on page 786. Use cylindrical coordinates to parameterize the interior of C in the plane $x + y + z = 1$.

11. Use both formulas in the boxed equation on page 786 and compare your results. C is a circle which you can parameterize using cylindrical coordinates. You can also parameterize the interior of C on the paraboloid using cylindrical coordinates.

Section 13.9, problems 1, 3, 11, 17

Hints:

1. Use both formulas in the boxed equation on page 791. To compute the surface integral you will have to calculate the flux across each of the 6 sides of the cube and add the results. Make sure the vector $r_u \times r_v$ points outside the cube at all times.

3. Use both formulas in the boxed equation on page 791. To compute the surface integral you will have to calculate the flux across the surface of the cylinder where $x^2 + y^2 = 1$ and $0 \leq z \leq 1$, across the bottom of the cylinder where $x^2 + y^2 \leq 1$ and $z = 0$, and across the top of the cylinder where $x^2 + y^2 \leq 1$ and $z = 1$. Make sure the vector $r_u \times r_v$ points outside the cylinder at all times.

11. Use the formula on the right-hand side of the boxed equation on page 791.

17. The flux across the top half of the sphere is equal to the combined flux across both the top half of the sphere and the region in the xy-plane that

it sits above minus the flux across just the planar region. You can calculate the combined flux as a triple integral using the divergence theorem, but you must compute the flux across the planar region as a surface integral.