Math 2415

Problem Section #10

15.1 Double Integrals over Rectangles

1. Evaluate the double integral, $\iint_R (2y+3)\,dA$, where $R=[0,3]\times[0,2]$ by identifying it as the volume of a solid.

2. Calculate $\iint_R ye^{xy}\,dA$ where $R=[0,1]\times[0,2]$.

3. (a) Explain why the paraboloid $z=2+x^2+y^2$ always lies under the plane $z=8$ when (x,y) is in the rectangle $[0,1]\times[0,2]$.
   (b) Sketch the solid enclosed by the paraboloid $z=2+x^2+y^2$ and the planes $x=0$, $x=1$, $y=0$, $y=2$, and $z=8$. **Hint:** Do this by sketching the curves obtained by intersecting $z=2+x^2+y^2$ in the four planes $x=0$, $x=1$, $y=0$, and $y=2$.
   (c) Set up a double integral to calculate the volume of this solid and evaluate the integral.

15.2: Double Integrals (Rectangular Coordinates)

1. Sketch a region that is Type I but not Type II.

2. Set up iterated integrals for both orders of integration for the integral $\iint_D y\,dA$, where D is bounded by $x=0$, $y=x$ and $y=3-x$. In which order is easier to do the iterated integrals? Explain. Evaluate the integral this way.

3. Evaluate $\iint_D x^2\,dA$ where D is the triangular region with vertices $(0,2)$, $(1,3)$, and $(4,0)$.

4. Evaluate the integral, $\int_{x=0}^{x=1}\int_{y=x^2}^{y=1}\sqrt{y}\sin(y)\,dy\,dx$ by reversing the order of integration.

5. Find the volume of the tetrahedron bounded by the coordinate planes and the plane $x+2y+3z=6$.

6. (a) Explain why the plane $z=x$ always lies under the the plane $z=4$ over the region in the xy-plane between $y=x^2$ and $y=1-x^2$.
   (b) Find the volume of the solid region under the plane $z=4$, above the plane $z=x$, and between the parabolic cylinders $y=x^2$ and $y=1-x^2$.

Exam Two Review

You can start review for Exam Two today. We will do more of these next week.

1. Spring 2019: 3
2. Fall 2017: 6
3. Fall 2016 Exam II: 1,2,4,6,7
4. Fall 2014 Exam II: 1,2,3,4
5. Fall 2012 Exam II:1,2,3,4,6,8