

Problem Set #5

Due: 10 October 2008

- (a) If $f(x, y)$ gives the pollution density, in micrograms per square meter, and x and y are measured in meters, give the units and practical interpretation of $\int_R f(x, y) dA$.

(b) Using Riemann sums with four equal subdivisions in each direction, find upper and lower bounds for the volume under the graph of $g(x, y) = 2 + xy$ over the rectangle $R = [0, 2] \times [0, 4]$.
- (a) Find the volume of the region bounded by the plane $ax + by + cz = 1$ and the coordinate planes. Assume a , b and c are positive constants.

(b) A rectangular plate of sides a and b is subjected to a normal force (that is, perpendicular to the plate). The pressure at any point on the plate is proportional to the square of the distance of that point from one corner. Find the total force on the plate. **Hint:** Pressure is force per unit area
- Rewrite the following sum of iterated integrals as a single iterated integral by reversing the order of integration, and evaluate.

$$\int_0^8 \int_0^{\sqrt{y/3}} y \, dx \, dy + \int_8^{12} \int_{\sqrt{y-8}}^{\sqrt{y/3}} y \, dx \, dy$$