

Math/MTHE 280

Advanced Calculus, Fall 2016

Homework 8, due Tuesday November 21, before NOON!

1(a) Compute the volume of the ice-cream cone bounded by the cone,  $z = \sqrt{x^2 + y^2}$ , and the hemisphere  $z = \sqrt{8 - x^2 - y^2}$ .

1(b) Find the average distance from the origin to points inside the icecream cone, described in part a).

2a) .A bead is made by drilling a small cylindrical hole of radius 1mm, through a sphere of radius 5mm. Set up a triple integral in cylindrical coordinates representing the volume of the bead. Evaluate the integral.

2b). Use the change of variables  $x = u - uv, y = uv$  to calculate the double integral  $\int \int_D \frac{1}{x+y} dydx$ , where the region D is bounded by the lines  $x = 0, y = 0, x + y = 1, x + y = 4$ .

3. By changing to polar coordinates, evaluate the double integral

$$\int \int_{\mathbb{R}^2} e^{-(x^2+y^2)} dx dy$$

4)Using your result from question 3, Show that  $\int_{-\infty}^{+\infty} e^{-x^2} dx = \sqrt{\pi}$