

Name:

Date:

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**Worksheet 7, Math 10560**

1. Show that

$$\int_{-\infty}^{\infty} \int_{-\infty}^{\infty} e^{-(x^2+y^2)} dA = \pi$$

and deduce that  $\int_{-\infty}^{\infty} e^{-x^2} dx = \sqrt{\pi}$ .

2. Find the mass of the tetrahedron with points given by  $(0, 0, 0)$ ,  $(2, 0, 0)$ ,  $(0, 3, 0)$ ,  $(0, 0, 1)$  with density function  $\rho(x, y, z) = x$ .

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3. Find the mass and center of mass of the solid  $E$  given by  $z = 1 - y^2$  and the planes  $x + z = 1$ ,  $x = 0$ , and  $z = 0$  and constant density  $\rho$ .

4. Find the mass and center of mass of the solid  $S$  bounded by the paraboloid  $z = 4x^2 + 4y^2$  and the plane  $z = a$  for  $a > 0$ , assuming that  $S$  has constant density  $K$ .