MATH 2415 Test 4 Name: _____

1. Let R be the 3D region $\{(x, y, z) : 0 \leq z \leq 5 - r^2\}$. Assume density $dm/dV = 4rz$.

(i) Express the mass of R as a triple integral.

(ii) Evaluate your integral. (For this step, it's fine to just use a calculator.)

2. Consider the sphere $S = \{(x, y, z) : x^2 + y^2 + z^2 = 1\}$. Let $f(x, y, z) = 5x^2 + 3y + 7z$. Find the maximum and minimum output values of f for (x, y, z) in S.