Math 2471 Calculus III – Sample Test 2

1. Classify the critical points for

$$(i) \quad z = x^3 + y^3 - 3x - 12y + 20$$

$$(ii) \quad z = 3xy - x^2 y - x y^2$$

2. Reverse the order of integration and integrate showing your steps.

$$\int_0^1 \int_{\sqrt{y}}^1 \frac{3\,dx\,dy}{1+x^3}$$

3. Find the volume bound by the paraboloid $z = 2 - x^2 - y^2$ and the cone $z = \sqrt{x^2 + y^2}$

4. Find the limits of integration of the triple integral

$$\iiint_V f(x,y,z)\,dV$$

where the volume is bound by

(i) $x = 0, x = 1, y = 0, z = 0, z = 1,$ and $z = 2 - y$.

(ii) $x = 0, z = 0, z = 1 - y^2,$ and $z = 2 - x$.

5. Set of the triple integral $\iiint_V z\,dV$ in both cylindrical and spherical coordinates for the volume inside the hemisphere $x^2 + y^2 + z^2 = 8$ and outside the cone $z = \sqrt{x^2 + y^2}, z \geq 0$.