

[20] 1. Consider

$$\int_0^1 \int_y^1 ye^{x^3} dx dy$$

a) Draw the region in the $x - y$ -plane.

b) Change the order of integration.

c) Evaluate.

[20] 2. Evaluate.

$$\int_{-1}^2 \int_0^{\sqrt{4-x^2}} (x^2 + y^2)^{1/2} dy dx$$

a) Draw the region.

b) Set up the integral in polar coordinates.

c) Evaluate.

[20] 3. Evaluate $\int \int_{\mathcal{B}} \int dV$ where \mathcal{B} is bounded by the cylinder $z = 4 - y^2$; $x + y = 2$ and $x + y = 4$.

[20] 4. Evaluate

$$\int \int \int_{\mathcal{B}} \sqrt{x^2 + y^2 + z^2} dV$$

where \mathcal{B} is $x^2 + y^2 + z^2 \leq 2z$. (i.e. the sphere centered at $(0,0,1)$ of radius 1.)

[20] 5. Evaluate.

$$\int_0^2 \int_0^{\sqrt{2x-x^2}} \int_0^{x^2+y^2} \frac{1}{\sqrt{x^2+y^2}} dz dy dx$$

- [10] 6. Find the mass of the sphere of radius 1 if the density is x^2 . i.e. evaluate $\int \int_{\mathcal{B}} \int x^2 dV$ where \mathcal{B} is the sphere $x^2 + y^2 + z^2 = 1$.