Sample Math. 2673 Fall, 2006

Part I. Answer the following:

2.) Graph the region and find the volume of the solid in the first octant enclosed by

$\rho = 1 - \cos(\phi)$.

3.) Graph the region of integration and evaluate:

$\int_0^2 \int_{y/2}^{(y+4)/2} \; y^3(2x-y)e^{(2x-y)^2} dxdy.$

b.) Describe a change of variable and graph the new region.

c.) Using that change of variable evaluate the integral.

4.) Describe the following integrals and evaluate: you may wish have to change the order of integration.

i.) $\int_1^4 \int_{\sqrt{(y)}}^{y} \ln(y/x)dxdy$

5.) Graph the region (you may wish to use spherical coords in maple) and find the volume bounded by the cone whose angle in spherical coordinates is given by $\phi = \frac{\pi}{3}$ and a sphere of radius 1.

6. Integrate $f(x,y) = x^3/y$ over the curve formed by C_1 and C_2

$C_1 : y = x^2/2, 0 \leq x \leq 2$ and

C_2 : line seqment between $(2,2) and (4,3)$

9.) Graph the region and find the volume of the intersection of 3 right circular cylinders given by $x^2 + y^2 = 1$, and $y^2 + z^2 = 1$

Part II. Answer the following:

1.) Find the Jacobian for change of coords for polars and cylindricals either way. (4 problems)

2.) Find the volume of the solid in the first octant bounded by the plane $x + 2y + z = 4$.

3.) Find the volume inside the paraboloid $z = (x^2 + y^2)$ and below the plane $z = 1$.

5.) Find the volume inside both the sphere $x^2 + y^2 + z^2 = 2$ and the paraboloid $z = x^2 + y^2$.

7.) The solid in the first octant volume bounded by the cylinder $z^2 + y^2 = 9$ and $z = x^2 + 3y^2$

8. If Ω =the triangle whose vertices are:$(0,0).(1,0),(1,1)$ and γ the boundary of Ω.

Set $M(x,y) = -ye^x$ and $N(x,y) = xe^y$

Verify Green's Theorem

9. Find $f(x,y)$ such that $\nabla f = F$ for each of the following:

a.) $F(x,y,z) = (yz, xz, xy)$

b.) $F(x,y,z) = ((\sec(x))^2, z, y+2z)$

10.) For $F(x,y,z) = y\sin(z)\imath + x\sin(z)\jmath + xy\cos(z)k$

a.) Find $\nabla \cdot F$

b.) Find $\nabla \times F$

11.) Evaluate $\int_C (x-y)dx+(x+y)dy$ where C is the unit square with a vertices at $(0,0),(0,1),(1,0),(1,1)$

flushpar **Part III. Answer the following:**

5.) Find the volume bounded of a sphere of radius 1.

You must do all the work and not just list the formula.

6.) Change the integral into spherical coordinates and evaluate it. $\int_0^{2\pi}\int_0^{\frac{\pi}{2}}\int_1^{1+\sin\theta}\rho^2\sin(\phi)d\rho\ d\phi\ d\theta$

7.) Find the volume inside both the sphere $x^2+y^2+z^2=9$ and the cylinder $x^2+y^2=1$.

Part IV. Answer the following:

2. The volume bounded by the cone whose angle in spherical coordiantes is given by $\phi = \frac{\pi}{4}$ and a sphere of radius2.

III. Describe the solid whose volume is given by the following integrals and

3. Change the integral into spherical coordinates and evaluate it. $\int_0^{\frac{\sqrt{2}}{2}}\int_y^{\sqrt{1-y^2}}\int_0^{\sqrt{1-x^2-y^2}}\ dz\ dx\ dy$

4. Change into cylindrical coordinates and evaluate. Evaluate this $\int_0^1\int_0^{\sqrt{1-x^2}}\int_0^{\sqrt{1-x^2-y^2}}\ dz\ dy\ dx$