

Name _____

Due Dec 6, 2006

Math. 2673

Project Fall, 2006

1.) Graph the region and find the volume of the right circular cylinder $r = 3 * \cos(\theta)$ that lies below the plane $z = 5 - x$ and above the x-y plane.

2.) Graph the region and find the volume of the solid in the first octant enclosed by $\rho = 1 - \cos(\phi)$.

3.) **(Corrected)** Graph the region of integration and describe the following integrals and evaluate:

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

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 (a graph may help for your description) and evaluate: you may wish have to change the order of integration.

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

ii.) $\int_0^{2\pi} \int_0^{\pi/2} \int_0^{\cos(\phi)} \rho^2 \sin(\phi) \cos(\phi) d\rho d\phi d\theta$

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

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

$$C_2 : \text{line segment between } (2, 2) \text{ and } (4, 3)$$

7.) Find I_x "read textbook" for the wire given by the semicircle $y^2 + z^2 = 1, z \geq 1$, in the YZ plane , if the density of the wire is given by $\delta(x, y, z) = 2 - z$

8.) Find the work done by the force $F(x, y, z) = (y + z)i + (z + x)j + (x + y)k$ "read textbook"
along the path $r(t) = ti + t^2j + t^4k, 0 \leq t \leq 1$

9) Let $F(x, y) = -yj + xj$ be a continuous velocity field and consider the closed path γ given
by the arch $r_1(t) = 3 \cos(t)i + 3 \sin(t)j, 0 \leq t \leq \pi$
followed by the line segment ($r_2(t)$) $(-3, 0)$, and $(3, 0)$

a.) Find the circulation.

b.) Find the Flux.