MATH 213- EXAM III -NOVEMBER 17, 2004

1) For the integral $\int_0^1 \int_{\frac{y}{2}}^{\frac{1}{2}} e^{-x^2} dxdy$

a)Sketch the region of integration
b)Reverse the order of integration
c)Evaluate the integral

2)Evaluate the integral $\int\int xy\, dA$, over the region enclosed in the first quadrant, outside the circle $r = 1$ and inside the circle $r = 2cos\theta$

3)Using triple integration and cylindrical coordinates find the mass ($\int\int\int \delta(x,y,z)\, dV$) of the ellipsoidal solid $4x^2 + 4y^2 + z^2 = 16$ lying above the x-y plane. The density at any point in the solid is given by $\delta(x,y,z) = 10z$.

4)Find, using double integration, the area of the surface for the portion of the plane $z = 24 - 3x - 2y$ in the first octant

5)For the region enclosed by the lines $x - 2y = 0, x - 2y = -4, x + y = 4, x + y = 1$ using the transformation $u = x + y$ and $v = x - 2y$
a)evaluate the Jacobian
b)evaluate the integral $\int\int xdxdy$ for the enclosed region above as double integral in the transformed $u - v$ region

6)
a)Evaluate the line integral $\int_C (x + 2)\, ds$ where C is the curve represented by $\mathbf{R} = 2t\mathbf{i} + \frac{4}{3}t^{\frac{3}{2}}\mathbf{j} + \frac{1}{2}t^2\mathbf{k}$, $0 \le t \le 2$
b)Find the curl of the vector field $\mathbf{F} = x^2z\mathbf{i} - 2xz\mathbf{j} + zy\mathbf{k}$ at the point (2,-1,3)