1)Calculate the double integrals:

a) $\int_0^1 \int_0^1 xy\sqrt{x^2+y^2}\,dydx$ b) $\int_0^4 \int_{\sqrt{x}}^2 \frac{1}{y^3+1}\,dydx.$

2) a)Evaluate the iterated integral: $\int_{-3}^3 \int_0^{\sqrt{9-x^2}} \sin(x^2+y^2)\,dydx.$

b) Use polar coordinates to find the volume of the solid bounded below by the cone $z=\sqrt{x^2+y^2}$ and above by the sphere $x^2+y^2+z^2=1.$

3) Find the area of the surface part of the sphere $x^2+y^2+z^2=1$ that lies inside within the cylinder $x^2+y^2=x$. (sketch the cylinder)

4)Use cylindrical coordinates to evaluate the triple integral: $\int_{-1}^1 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} \int_{\sqrt{x^2+y^2}}^1 \sqrt{x^2+y^2}\,dzdydx.$

5) a) Change the point $(\rho,\theta,\emptyset)=(4,-\frac{\pi}{4},\frac{\pi}{3})$ in spherical coordinates to rectangular coordinates.

b) Write the equation $x^2-2x+y^2+z^2=0$ in spherical coordinates.

c) Use spherical coordinates to evaluate the triple integral $\iiint_B e^{2(x^2+y^2+z^2)^{\frac{3}{2}}}dV$, where B is the unit sphere in the 3-space.