Lecture 4

1. Find the work required to move an object with given force field $\mathbf{F} = \dfrac{\langle x,\ y,\ z \rangle}{\left(x^2 + y^2 + z^2 \right)^{3/2}}$ on the path

   $r(t) = \left\langle t^2,\ 3t^2,\ -t^2 \right\rangle$ for $1 \le t \le 2$

2. Evaluate the line integral $\displaystyle\int_C \mathbf{F} \cdot d\mathbf{r}$ for the vector fields $\mathbf{F}$ and curves C.

   $\mathbf{F} = \nabla(xyz); \quad C : r(t) = \left\langle \cos t,\ \sin t,\ \dfrac{t}{\pi} \right\rangle, \quad for\ \ 0 \le t \le \pi$

3. Find the area of the surface of the frustum of the cone $z^2 = x^2 + y^2$, for $2 \le z \le 4$ (excluding the bases). (Use a surface integral)

4. Evaluate the surface integral $\displaystyle\iint_S (1 + yz)\,dS$; S is the plane $x + y + z = 2$ in the first octant.