(1) Find the mass of the tetrahedron bounded by the planes $x = 0$, $y = 0$, $z = 0$, and $x+y+z = 1$ if the density is given by $\delta(x, y, z) = 1 - z$.

(2) Find the centroid of the region between the xy-plane and $z = 1 - x^2 - y^2$.

(3) Find the mass of the earth if the density is given by $\delta = \frac{K}{\rho}$ and the radius is R.

(4) Find the length of the curve $y = \sqrt{x}$ from $x = 0$ to $x = 1$.

(5) Find the line integral $\int_L (2x + 2y)\,dx + (2x + 9y^2)\,dy$ along the line from $(0, 1)$ to $(2, 4)$ both directly and by using the fundamental theorem.

(6) Find the line integral $\int_L (2x \cos y + 5)\,dx + (x - x^2 \sin y)\,dy$ counterclockwise around the ellipse $\frac{x^2}{2} + \frac{y^2}{5} = 1$ both directly and by Green's Theorem.

(7) Find φ such that $f = \nabla\varphi$: $f(x, y) = (x + \sin y)\mathbf{i} + (x \cos y + 5)\mathbf{j}$.

(8) Find φ such that $f = \nabla\varphi$: $f(x, y, z) = (7yz^2 + 1)\mathbf{i} + (7xz^2 + y)\mathbf{j} + (14xyz + \cos z)\mathbf{k}$.

(9) How much work is required to stretch a spring with spring constant k from equilibrium to L units beyond equilibruim?