

## MA3180 (Financial Mathematics I) Assignment 5

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1. Calculate the volume of the given solid.

(i) Bounded by the cylinder  $x^2 + y^2 = 9$  and planes  $x = 0$ ,  $y = 0$ ,  $z = 0$ ,  $x + 2y = 2$  in the first octant.

(ii) Above the paraboloid  $z = x^2 + y^2$  and below the half-cone  $z = \sqrt{x^2 + y^2}$ .

2. Calculate the area of the surface.

(i) The part of the plane  $x + 2y + z = 4$  that lies inside the cylinder  $x^2 + y^2 = 4$ .

(ii) The part of paraboloid  $z = 4 - x^2 - y^2$  that lies above the  $xy$ -plane.

(iii) The part of the sphere  $x^2 + y^2 + z^2 = a^2$  that lies within the the cylinder  $x^2 + y^2 = ax$  and above the  $xy$ -plane.

3. Evaluate the following triple integrals.

(i)  $\int \int \int_{\Omega} y dV$  where  $\Omega$  lies under the plane  $z = x + 2y$  and the above the region in the  $xy$ -plane bounded by the curves  $y = x^2$ ,  $y = 0$  and  $x = 1$ .

(ii)  $\int \int \int_{\Omega} (x + 2y) dV$  where  $\Omega$  is bounded by paraboloid cylinder  $y = x^2$  and the planes  $x = z$ ,  $x = y$  and  $z = 0$ .

(iii)  $\int \int \int_{\Omega} z dV$  where  $\Omega$  is bounded by the cylinder  $y^2 + z^2 = 9$  and the planes  $x = 0$ ,  $y = 3x$  and  $z = 0$  in the first octant.