January 18, 2005 Lecturer Dmitri Zaitsev Hilary Term 2005

Course 2E1 2004-05 (SF Engineers & MSISS & MEMS)

S h e e t 10

Due: in the tutorial sessions next Wednesday/Thursday

Exercise 1

Find the area in polar coordinates (r, θ) of the region R:

(i) R is the region inside the curve $r = \sqrt{1 - \sin\theta}$;

(ii) R is the region inside the cardioid $r = 1 + \cos\theta$;

(iii) R is the region common to the interior of the cardioids $r = 1+\cos\theta$ and $r = 1-\cos\theta$.

Exercise 2

Find the volume of the space region D:

(i) D is the pyramid bounded by the coordinate planes and the plane $x + 2y + z = 2$;

(ii) D is the prism bounded by the coordinate planes and the planes $x + y = 1$, $z = 1$;

(iii) D is the region bounded the coordinate planes, the plane $y+z = 1$ and the cylinder $x = 1 - y^2$.