

## Math 53 Discussion Problems Sept 12

1. Sketch the regions of represented by the equations.

(a)  $x \geq 0, y \geq 0, z = 0$

(b)  $z = y^3, x = 2$

(c)  $x \leq y^2, 0 \leq z \leq 2$

2. Write equations to describe the regions.

(a) The upper hemisphere of radius 1 centred at the origin

(b) The intersection of the plane through  $(1, 1, 3)$  and the sphere of radius 5 centred at the origin.

(c) The set of all points equidistant from the point  $(0, 0, 2)$  and the  $xy$ -plane.

3. Given  $\mathbf{a} = \mathbf{i} + 2\mathbf{j}$ ,  $\mathbf{b} = \mathbf{j} - 3\mathbf{k}$ , calculate

(a)  $3\mathbf{a} + \mathbf{b}$ .

(b)  $|\mathbf{a} - 2\mathbf{b}|$

(c) The unit vector in the direction of  $\mathbf{a} + \mathbf{b}$