

- 1 Plot and label the following two lines on engineering paper, with 1 unit = 1cm (2 pts)  
 Line A  $0x + 1y = 2$   
 Line B  $1x + 1y = 3$

- 2 Find and label coordinates of the point where the lines intersect. (2 pts)  
 Note that the point of intersection is the same as where the following three planes intersect:  
 Plane A  $0x + 1y + 0z = 2$   
 Plane B  $1x + 1y + 0z = 3$   
 Plane C  $0x + 0y + 1z = 0$

$$x = 1 \qquad y = 2$$

- 4 Draw and label a normal from the origin to each line. The normal to line A is “a” and the normal to line B is “b”. Put an arrowhead on each normal where it touches the line. (2 pts)
- 5 Measure the distance from the origin to each line (include 3 significant figures in your answer). The distance is positive if the normal points from the origin to the line. For a refresher on significant figures, see <http://lectureonline.cl.msu.edu/~mmp/applist/sigfig/sig.htm>. (2 pts)

Distance from origin to line A ( $d_A$ ) 2.000

Distance from origin to line B ( $d_B$ ) 2.121

- 6 Label and measure the angles between the normal to each line and the x- and y-axes (this is a total of four angles). For example, the angle between “a” and the x-axis is  $\theta_{ax}$ . (4 pts)

$$\theta_{ax} \quad 90^\circ \qquad \theta_{ay} \quad 0^\circ$$

$$\theta_{bx} \quad 45^\circ \qquad \theta_{by} \quad 45^\circ$$

- 7 Find the cosines of the angles between each line and the x- and y-axes (this is a total of four cosines). For example, the cosine of  $\theta_{ax}$  is  $n_{Ax}$ . (4 pts)

$$n_{Ax} \quad 0 \qquad n_{Ay} \quad 1$$

$$n_{Bx} \quad 0.7071 \qquad n_{By} \quad 0.7071$$

- 8 Write the equation of each line in the form below, filling in the values for the cosine terms.

$$n_{Ax} x + n_{Ay} y = d_A \quad 0x + 1y = 2$$

$$n_{Bx} x + n_{By} y = d_B \quad 0.7071x + 0.7071y = 2.12 \qquad (2 \text{ pts})$$

- 9 Using your answer for (2) and eqs. (8), solve for  $d_A$  (2.000) and  $d_B$  (2.121) (2 pts)