

Math 243
Spring 2017
Assignment 1
Selected solutions

Section 11.1:

(4) The line in the xz -plane, parallel to the z -axis, a distance 1 away from the z -axis in the positive x -direction.

(8) The unit circle ~~is a circle~~ centred at the origin, in the yz -plane.

$$\begin{aligned} (36) \quad |P_1 P_2| &= \sqrt{(2-1)^2 + (5-1)^2 + (0-5)^2} \\ &= \sqrt{9 + 16 + 25} \\ &= \sqrt{50} = \boxed{5\sqrt{2}} \end{aligned}$$

$$\begin{aligned} (46) \quad (x-0)^2 + (y-1)^2 + (z-5)^2 &= 2^2 \\ \text{so } \boxed{x^2 + (y+1)^2 + (z-5)^2} &= 4 \end{aligned}$$

Section 11.2:

$$\begin{aligned} (20) \quad \vec{AB} &= (-1-1)\hat{i} + (4-0)\hat{j} + (5-3)\hat{k} \\ &= \boxed{-2\hat{i} + 4\hat{j} + 2\hat{k}} \end{aligned}$$

$$(26) \quad \vec{v} = (9, -2, 6) \quad |\vec{v}| = \sqrt{9^2 + (-2)^2 + 6^2} = \sqrt{81 + 4 + 36} = \sqrt{121} = 11$$

$$\text{so } \boxed{\vec{v} = 11 \cdot \left(\frac{9}{11}, \frac{-2}{11}, \frac{6}{11} \right)}$$

length direction

$$(34) \vec{v} = \left(\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}\right). \text{ Want } \vec{w} = -3\hat{v}.$$

$$\hat{v} = \frac{\vec{v}}{|\vec{v}|}$$

$$|\vec{v}| = \sqrt{\left(\frac{1}{2}\right)^2 + \left(-\frac{1}{2}\right)^2 + \left(-\frac{1}{2}\right)^2}$$

$$= \sqrt{\frac{1}{4} + \frac{1}{4} + \frac{1}{4}}$$

$$= \frac{\sqrt{3}}{2}$$

$$\text{so } \vec{w} = -3 \cdot \frac{2}{\sqrt{3}} \left(\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}\right)$$

$$= \boxed{(-\sqrt{3}, \sqrt{3}, \sqrt{3})}$$

Other exercises:

(2) First octant is given by $x \geq 0, y \geq 0, z \geq 0$.

If $z=2$, then $z \geq 0$ is automatically true.

$$\text{so } \boxed{x \geq 0, y \geq 0, z=2}$$