Tutorial 10

Question 1.

Show that for non-parallel vectors $\mathbf{a}$, $\mathbf{b}$ in $\mathbb{R}^3$, $\quad \|\mathbf{a}-\mathrm{b}\|^2+\|\mathbf{a}+\mathrm{b}\|^2=2\|\mathbf{a}\|^2+2\|\mathrm{b}\|^2$

Question 2.

Find an equation of the form $\mathbf{r}(t)=\mathbf{a}+t\mathbf{b}$ for the line in $\mathbb{R}^3$ through the points $(1,3,5)$ and $(6,9,17)$.

Express the same line in terms of equations of the form $ax+by+cz=d$.

Find the perpendicular distance of the origin from this line.

Question 3.

Find all solutions of the following systems of equations.

(a)

$$\begin{aligned} 3x &+ 4y &&= 10 \\ 7x &- 5y &&= 9 \\ 5x &+ 6y &&= 16 \end{aligned}$$

(b)

$$\begin{aligned} 2x &+ 4y &+ 4z &= 7 \\ 3x &- 7y &- 2z &= 15 \\ 5x &- 3y &+ 2z &= 20 \end{aligned}$$