1. (ii) $116.6°$.
   (iii) $\frac{3}{\sqrt{5}}$.

2. (ii) $\mathbf{r} \cdot \begin{pmatrix} 21 \\ -3 \\ -7 \end{pmatrix} = 105$.
   (iii) 2 units.
   $2\sqrt{50}$ units^2.
   (iv) $\mathbf{r} = \begin{pmatrix} 5 \\ 0 \\ 0 \end{pmatrix} + \nu \begin{pmatrix} 1 \\ 0 \\ -3 \end{pmatrix}, \ \nu \in \mathbb{R}$.
   (v) $a = -\frac{1}{7}, 7 + 6b = c$.

3. (i) $\mathbf{r} = \begin{pmatrix} 3 \\ 4 \\ 5 \end{pmatrix} + \lambda \begin{pmatrix} -1 \\ 2 \\ 1 \end{pmatrix}, \ \lambda \in \mathbb{R}$.
   (ii) $\overrightarrow{ON} = 5\mathbf{i} + 3\mathbf{k}$.
   (iii) $x - 3 = \frac{y-4}{3} = \frac{z-5}{7}$.
   (iv) $20\sqrt{2}$units^2.

4. (i) $\mathbf{r} = \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix} + \lambda \begin{pmatrix} -1 \\ 2 \\ 0 \end{pmatrix}, \ \lambda \in \mathbb{R}$.
   (ii) $\begin{pmatrix} 0 \\ 1 \\ 45 \end{pmatrix}$ or $\begin{pmatrix} 0 \\ 1 \\ -45 \end{pmatrix}$
   (iii) $6.4°$.

5. (i) $\frac{1}{\lambda+1} \begin{pmatrix} -3 + \lambda \\ 2 + 6\lambda \\ -5 - \lambda \end{pmatrix}$.
   (ii) $124.2°$.
   (iii) $\sqrt{26}$.
   (v) $\frac{1}{2}\sqrt{78}$.

6. (ii) $\frac{3}{\sqrt{15}}$.
   $4\sqrt{2}$.
   (iii) $(-2.4, 0, 4.8)$.

7. (ii) $(-6, 1, 1), (26, -11, 1)$.
   (iii) $a = -5, b = -25$.
   (iv) $\alpha = 5, \beta = 5$.

8. (i) $17.7°$.
   (iii) $\mathbf{r} = \begin{pmatrix} \frac{86}{25} \\ \frac{167}{50} \\ 0 \end{pmatrix} + \mu \begin{pmatrix} -19 \\ -9 \\ 25 \end{pmatrix}, \ \mu \in \mathbb{R}$.
   (iv) $F(0, 1, -4), B(7, -11, -3)$.