

## § 1.2 Solutions

1.  $\underline{u} \cdot \underline{v} = 1.4$

$\underline{u} \cdot \underline{w} = 0$

$\underline{u} \cdot (\underline{v} + \underline{w}) = 1.4$

$\underline{w} \cdot \underline{v} = 48.$

2.  $\|\underline{u}\| = 1$ ,  $\|\underline{v}\| = 5$ ,  $\|\underline{w}\| = 10$

7. (a) 1.0472 ( $\pi/3 \approx 60^\circ$ )

(b) 1.5708 ( $\pi/2 \approx 90^\circ$ )

(c) 1.0472 ( $\pi/3 \approx 60^\circ$ )

(d) 2.1562 ( $3/4 \pi \approx 135^\circ$ )

13.  $\begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix}$  and  $\begin{pmatrix} 1 \\ 0 \\ -1 \end{pmatrix}$ .

14.  $\begin{pmatrix} 1 \\ -1 \\ 0 \\ 0 \end{pmatrix}$ ,  $\begin{pmatrix} -1 \\ 1 \\ 0 \\ 0 \end{pmatrix}$ ,  $\begin{pmatrix} 0 \\ 0 \\ -1 \\ 1 \end{pmatrix}$ ,  $\begin{pmatrix} 0 \\ 0 \\ 1 \\ -1 \end{pmatrix}$ .

16.  $\|\underline{v}\| = 3$

$\frac{1}{\|\underline{v}\|} \underline{v} = \begin{bmatrix} 1/3 \\ 1/3 \\ \vdots \\ 1/3 \end{bmatrix}$  is a unit vector with same direction.

$\underline{w} = (1 \ -1 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0)$  is orthogonal to  $\underline{v}$