

M308D HW 5 answers

Sec 3.5

18.  $\dim(W) = 2$

34. Use Theorem 11 on p. 76 or Theorem 9 on p.207, note that the columns of  $A$  are vectors in  $R^3$

35. similar to 34

Sec 3.6

2.  $u_1^T u_2 = u_1^T u_3 = u_2^T u_3 = 0$

10.  $v = u_1 + u_2$

20.  $N(A)$  a basis  $\begin{bmatrix} -1 \\ -3 \\ 1 \\ 0 \\ 0 \end{bmatrix}$ ,  $\begin{bmatrix} -2 \\ -3 \\ 0 \\ 1 \\ 0 \end{bmatrix}$ ,  $\begin{bmatrix} -3 \\ -2 \\ 0 \\ 0 \\ 1 \end{bmatrix}$ , an orthogonal basis  $\begin{bmatrix} -1 \\ -3 \\ 1 \\ 0 \\ 0 \end{bmatrix}$ ,  $\begin{bmatrix} -1 \\ 0 \\ -1 \\ 1 \\ 0 \end{bmatrix}$ ,  $\begin{bmatrix} -13/11 \\ 5/11 \\ 2/11 \\ -1 \\ 1 \end{bmatrix}$ .

$R(A)$  a basis  $\begin{bmatrix} 1 \\ -1 \\ 2 \end{bmatrix}$ ,  $\begin{bmatrix} 3 \\ 2 \\ -1 \end{bmatrix}$ , an orthogonal basis  $\begin{bmatrix} 1 \\ -1 \\ 2 \end{bmatrix}$ ,  $\begin{bmatrix} 19/6 \\ 11/6 \\ -2/3 \end{bmatrix}$ .

$$\begin{aligned} 28. \|v\|^2 &= (a_1 u_1 + \cdots + a_p u_p)^T (a_1 u_1 + \cdots + a_p u_p) = (a_1 u_1)^T (a_1 u_1 + \cdots + a_p u_p) + \\ &\cdots + (a_p u_p)^T (a_1 u_1 + \cdots + a_p u_p) \\ &= (a_1 u_1)^T a_1 u_1 + \cdots + (a_p u_p)^T a_p u_p = a_1^2 + \cdots + a_p^2. \end{aligned}$$