선대 숙제 4 답

1. $\begin{pmatrix}1&0\\1&1\\1&2\end{pmatrix}\cdot\left(\left(\begin{pmatrix}1&0\\1&1\\1&2\end{pmatrix}^{T}\cdot\begin{pmatrix}1&0\\1&1\\1&2\end{pmatrix}\right)^{-1}\cdot\begin{pmatrix}1&0\\1&1\\1&2\end{pmatrix}^{T}\right)$

$= \frac{1}{6}\begin{pmatrix}5&2&-1\\2&2&2\\-1&2&5\end{pmatrix}$

2.

Pb= $\begin{pmatrix}\frac{5}{6}&\frac{1}{3}&-\frac{1}{6}\\\frac{1}{3}&\frac{1}{3}&\frac{1}{3}\\-\frac{1}{6}&\frac{1}{3}&\frac{5}{6}\end{pmatrix}\cdot\begin{pmatrix}6\\0\\0\end{pmatrix} = \begin{pmatrix}5\\2\\-1\end{pmatrix}$

PPb= $\begin{pmatrix}\frac{5}{6}&\frac{1}{3}&-\frac{1}{6}\\\frac{1}{3}&\frac{1}{3}&\frac{1}{3}\\-\frac{1}{6}&\frac{1}{3}&\frac{5}{6}\end{pmatrix}\cdot\begin{pmatrix}5\\2\\-1\end{pmatrix} = \begin{pmatrix}5\\2\\-1\end{pmatrix}$

3 .Q Q^T = $\begin{pmatrix}1&0\\0&1\end{pmatrix}$

Q^T Q = $\frac{1}{9}\begin{pmatrix}5&4&-2\\4&5&2\\-2&2&8\end{pmatrix}$

4. $v_1 = \begin{bmatrix}1\\1\\1\end{bmatrix}$ $w_1 = \begin{bmatrix}\frac{1}{3}\\-\frac{1}{3}\\\frac{5}{3}\end{bmatrix}, \|v_1\| = \sqrt{3}, \|w_1\| = \sqrt{3},$

5. $v_2 = \begin{bmatrix}1\\2\\2\end{bmatrix}$ $w_2 = \begin{bmatrix}\frac{1}{3}\\-\frac{4}{3}\\\frac{8}{3}\end{bmatrix}, \|v_2\| = 3, \|w_2\| = 3,$

6. $\frac{v_1^T}{\|v_1\|}\cdot\frac{v_2}{\|v_2\|} = \frac{5}{9}\sqrt{3}$

7. $\frac{w_1^T}{\|w_1\|}\cdot\frac{w_2}{\|w_2\|} = \frac{5}{9}\sqrt{3}$, 문제 6과 같다.

8. $\sqrt{v_1^2 + v_2^2}$

9. $\cos\theta$

10. $A = \begin{bmatrix}1\\-1\\0\end{bmatrix}$, $B = \begin{bmatrix}1\\1\\-2\end{bmatrix}, C = \begin{bmatrix}1\\1\\1\end{bmatrix}$

11. $q_1 = \frac{1}{\sqrt{2}}\begin{bmatrix}1\\-1\\0\end{bmatrix}$, $q_2 = \frac{1}{\sqrt{6}}\begin{bmatrix}1\\1\\-2\end{bmatrix}, q_3 = \frac{1}{\sqrt{3}}\begin{bmatrix}1\\1\\1\end{bmatrix}$

12. q1.q2=0, q1.q3=0, q2.q2=0. 서로 직교한다.

13.

$$A = \begin{bmatrix}1&2&3\\-1&0&-3\\0&-2&3\end{bmatrix} = \begin{bmatrix}1/\sqrt{2}&1/\sqrt{6}&1/\sqrt{3}\\-1/\sqrt{2}&1/\sqrt{6}&1/\sqrt{3}\\0&-2/\sqrt{6}&1/\sqrt{3}\end{bmatrix}\begin{bmatrix}\sqrt{2}&\sqrt{2}&\sqrt{18}\\0&\sqrt{6}&-\sqrt{6}\\0&0&\sqrt{3}\end{bmatrix} = QR.$$