Homework 7

1. (10 points) Derivation 15 in the book (page 182)

2. (5 points) Find the matrix that increases the length of any vector by 3 in the $(1, 1, 2)$ direction.

3. (5 points) Prove that

$$\det \begin{pmatrix} A & B \\ C & D \end{pmatrix} = \det(AD - BC) \tag{1}$$

4. (5 points) Calculate the eigenvalues and eigenvectors of (without using a computer)

$$\begin{pmatrix} 1 & 2 & 3 \\ 2 & 3 & 7 \\ 3 & 7 & 8 \end{pmatrix} \tag{2}$$

5. (5 points) What is the axis and angle of rotation described by

$$C = \begin{pmatrix} \frac{2}{\sqrt{5}} & 0 & -\frac{1}{\sqrt{5}} \\ \frac{1}{\sqrt{5}} & 0 & \frac{2}{\sqrt{5}} \\ 0 & -1 & 0 \end{pmatrix} \tag{3}$$