ANSWERS to Lecture 11 problems

1. (a) $\begin{pmatrix} 1 & 2 \\ 0 & 3 \end{pmatrix}$ (b) not defined (c) $\begin{pmatrix} -2 & 2 & 4 \\ 5 & 4 & 5 \end{pmatrix}$

   (d) $\begin{pmatrix} 0 & 2 & -1 \\ 12 & 7 & 7 \end{pmatrix}$ (e) $\begin{pmatrix} -5 & 4 \\ 7 & 13 \end{pmatrix}$

   (f) $\begin{pmatrix} -5 & 7 \\ 4 & 13 \end{pmatrix}$ (g) $\begin{pmatrix} 4 & -3 & 5 \\ 12 & 3 & 9 \\ 8 & 12 & 1 \end{pmatrix}$ (h) $\begin{pmatrix} -5 & 7 \\ 4 & 13 \end{pmatrix}$

2. $r \times r$.

3. $(\mathbf{A}\mathbf{A}^{\mathrm{T}})^{\mathrm{T}} = \mathbf{A}\mathbf{A}^{\mathrm{T}}$ so the matrix is equal to its transpose, which is the signature of a symmetric matrix.

4. (i) $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ (ii) $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ (iii) $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ (iv) $\begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix} = 0$ (v) $\begin{pmatrix} 0 & 2i \\ 2i & 0 \end{pmatrix}$

5. $\mathbf{B} = \begin{pmatrix} 0.22 & 0.22 & 0.20 & 0.22 \\ 0.15 & 0.20 & 0.08 & 0.05 \\ 0.15 & 0.18 & 0.04 & 0 \\ 0.31 & 0 & 0.12 & 0 \\ 2 & 3 & 0 & 0 \end{pmatrix}$; $\mathbf{r} = \begin{pmatrix} 75.4 \\ 47.9 \\ 39.8 \\ 40.6 \\ 56.0 \end{pmatrix}$