Hw 5

3.2.2 a) symmetric
b) skew - symmetric
c) symmetric
d) neither

3.2.3 a) $A = \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$

b) $A = \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$

c) $A = \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$

3.2.5. a) by definition,

$$a_{ij} = -a_{ji}.$$

$$\Rightarrow a_{jj} = -a_{jj}$$

$$a_{jj} = 0$$

b) by definition,

$$\underline{A^*} = -A$$

$$\Rightarrow a_{ij} = -a_{ij}$$

$$\Rightarrow a_{ij} = ni \qquad n \in \mathbb{Z}$$

c)?

3.2.6 a) Let $A = \begin{pmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{pmatrix}$ and $A^T = \begin{pmatrix} a_{11} & a_{21} & a_{31} \\ a_{12} & a_{22} & a_{32} \\ a_{13} & a_{23} & a_{33} \end{pmatrix}$

$$A + A^T = \begin{pmatrix} a_{11}+a_{11} & a_{12}+a_{21} & a_{13}+a_{31} \\ a_{21}+a_{12} & a_{22}+a_{22} & a_{23}+a_{32} \\ a_{31}+a_{13} & a_{32}+a_{23} & a_{33}+a_{33} \end{pmatrix}$$

By definition, $(A+A^T)^T = A^T + A = A + A^T$

So $A^T + A$ is symmetric.