Chapter 1

Assignment Sheet 1

Chapter 2

Assignment Sheet 2

2.1

2.1.1

Equivalent matrix: $B = T^{-1}AS$

Equivalence relation:

1. reflexive property $x = x$
2. symmetric property $x = y \Rightarrow y = x$
3. transitive property $a = b \land b = c \Rightarrow a = c$

2.1.2

Invertible Matrix:

$$AA^{-1} = A^{-1}A = I$$

For square matrices:

$$det(A) \neq 0$$

2.1.3

Trivial.

2.1.4

Similar:

$$B = T^{-1}AS$$

with

$$T = S$$

2.2

Trivial.

2.3

2.3.1

Determinant:

- 2×2:

$$det(A) = det \begin{bmatrix} a & b \\ c & d \end{bmatrix} = ad - bc$$

- 3×3:

$$det(A) = det \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix} = adet \begin{bmatrix} e & f \\ h & i \end{bmatrix} - bdet \begin{bmatrix} d & f \\ g & i \end{bmatrix} + cdet \begin{bmatrix} d & e \\ g & h \end{bmatrix}$$

- $n \times n$:

$$det(A) = \sum_{\sigma \epsilon S_n} (sgn(\epsilon) \prod_{i=1}^{n} a_i, \sigma_i)$$

  Do note this is mostly irrelevant, since you can just perform something equivalent to a 3×3 determinant over and over again for larger matrices.