Session 05 Graph Theory

- Eulerian Path
- Isomorphism
- Adjacency matrices

Adjacency Matrices

$$\begin{pmatrix} o & 1 & 0 & 1 & 1 \\ 1 & 0 & 1 & 0 & 1 \\ 1 & 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 1 & 1 \\ 1 & 1 & 0 & 1 & 0 \end{pmatrix}$$

Functions

- Domain of a Function
- Range of a function
- Inverse of a function
- one-one (surjective)
- onto (bijective)

Probability

Binomial Coefficients

- factorials

$$n! = (n) \times (n-1) \times (n-2) \times \ldots \times 1$$

  - $5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$
  - $3! = 3 \times 2 \times 1$

- Zero factorial

$$0! = 1$$

The complement rule in Probability
$P(C') = 1 - P(C)$
If the probability of C is 70% then the probability of C' is 30%

1 Matrices

What are the dimensions of the following matrix

$$\begin{pmatrix} a_1 & a_2 \\ b_1 & b_2 \end{pmatrix} \begin{pmatrix} c_1 & d_1 \\ c_2 & d_2 \end{pmatrix} = \begin{pmatrix} (a_1 \times c_1) + (a_2 \times c_2) & (a_1 \times d_1) + (a_2 \times d_2) \\ (b_1 \times c_1) + (b_2 \times c_2) & (b_1 \times d_1) + (b_2 \times d_2) \end{pmatrix}$$

$$\begin{pmatrix} 1 & 3 \\ 0 & 2 \end{pmatrix} \begin{pmatrix} 1 & 2 \\ 4 & 1 \end{pmatrix} = \begin{pmatrix} (1 \times 1) + (3 \times 4) & (1 \times 2) + (3 \times 1) \\ (0 \times 4) + (2 \times 4) & (0 \times 2) + (2 \times 1) \end{pmatrix} = \begin{pmatrix} 14 & 5 \\ 8 & 2 \end{pmatrix}$$

$$\left(\begin{pmatrix} 1 & 2 \\ 4 & 1 \end{pmatrix} \begin{matrix} 1 & 3 \\ 0 & 2 \end{matrix} \right) = ?$$

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