Recommender Systems

1. The user-item matrix below shows the purchasing history of 5 users with respect to 9 different books in a user-based collaborative filtering system.

   Based on this data, who will be user U3's nearest neighbour? Calculate similarities using the binary Jaccard Index.

	B1	B2	B3	B4	B5	B6	B7	B8	B9
U1		1		1		1	1		
U2			1		1			1	
U3	1	1		1			1		1
U4	1	1				1		1	
U5			1	1	1				

2. The user-item matrix below shows the purchasing history of 6 users for 10 different products in a user-based collaborative filtering system.

   Who will be user U1's nearest neighbour in the data? Calculate similarities using the binary Jaccard Index.

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
U1		1		1		1		1		1
U2	1		1				1			
U3				1				1		
U4		1		1						
U5				1		1		1		1
U6	1	1	1							

3. The table below was generated as part of the evaluation of a collaborative filtering system which attempts to predict star ratings (1-5) for movies. The predicted and true ratings for 7 test examples are reported.

Movie	True Rating (Stars)	Predicted Rating
Brooklyn	4	3.2
Toy Story 3	5	4.7
Batman v Superman	2	1.8
Angry Birds	1	3.2
The Shallows	2	2.0
Spectre	3	3.9
The Martian	4	4.1

Calculate the performance of the system based on the metrics:

(a) Mean Absolute Error (MAE)

(b) Root Mean Square Error (RMSE)