Exercise 2: Poker Game [50 marks]

Problem Statement

A game of poker is played between two players. Each player is dealt a hand of five cards. The player with the higher-ranking hand wins the game.

In this exercise, you are to write a program to determine which player wins the game or there is a draw, given the hands of both players. To simplify the problem, we do not consider the suit of the cards.

A hand of cards is described by its ***type*** and ***key card*** as defined below:

Type	Rank	Definition	Key card	Examples
Four-of-a-kind	4	Four of the cards are identical.	One of the four identical cards.	**2** 2 2 2 J K **Q** Q Q Q
Three-of-a-kind	3	Three of the cards are identical.	One of the three identical cards.	**3** 3 3 A A 8 8 **10** 10 10
Pair	2	One or more pairs of cards are identical.	The highest-ranking card among the pairs.	**9** 9 A 2 3 9 9 **J** J 5
No-pair	1	None of the cards are identical.	The highest-ranking card in the hand.	5 **J** 2 4 8 **Q** 9 7 3 6

(Note: the key card of each hand is highlighted in **bold**.)

A hand of a higher rank in type always wins another hand of a lower rank in type, regardless of their key card. For example, four-of-a-kind always wins three-of-a-kind, while pair always wins no-pair.

When two hands are of the same rank in type, the one with a key card of a higher rank wins. The rank of cards is as listed below.

Card	Rank	Card	Rank	Card	Rank	Card	Rank
A	13	10	9	6	5	2	1
K	12	9	8	5	4		
Q	11	8	7	4	3		
J	10	7	6	3	2		

Your program should read in two arrays of five integers that represent the hands of the two players. The integers are between 1 and 13, corresponding to A, 2, 3, …, J, Q, K, respectively. Your program should print messages indicating (1) the type ranks and the key card ranks of both hands, and (2) which player wins or there is a draw.

You may assume that the inputs are valid (*i.e.*, the integers are within the specified range and there would be no more than four cards of the same card number).

Write on the skeleton file **poker.c** given to you. You need to include two functions:

- **type_and_keycard_ranks()** which takes in an array representing a hand, and returns both the rank of its type and the rank of its key card.
- **who_wins()** which takes in the type rank and the key card rank of both hands, and returns 1 if player 1 wins, 2 if player 2 wins, or 0 if there is a draw.

You may define additional functions as needed. Check sample runs below for input and output format. The input and output files for these sample runs are available in your plab account.

Sample Runs

Five sample runs are shown below with user input highlighted in **bold**.

```
Enter the hand of player 1:
2 2 2 2 11
Enter the hand of player 2:
3 3 3 1 1
Player 1 has a hand of type rank 4 and key card rank 1.
Player 2 has a hand of type rank 3 and key card rank 2.
Player 1 wins.
```

```
Enter the hand of player 1:
5 11 2 4 8
Enter the hand of player 2:
9 9 1 2 3
Player 1 has a hand of type rank 1 and key card rank 10.
Player 2 has a hand of type rank 2 and key card rank 8.
Player 2 wins.
```

```
Enter the hand of player 1:
2 2 2 2 11
Enter the hand of player 2:
13 12 12 12 12
Player 1 has a hand of type rank 4 and key card rank 1.
Player 2 has a hand of type rank 4 and key card rank 11.
Player 2 wins.
```

```
Enter the hand of player 1:
5 11 2 4 8
Enter the hand of player 2:
8 5 11 10 7
Player 1 has a hand of type rank 1 and key card rank 10.
Player 2 has a hand of type rank 1 and key card rank 10.
There is a draw.
```

```
Enter the hand of player 1:
9 9 11 11 5
Enter the hand of player 2:
10 10 1 2 3
Player 1 has a hand of type rank 2 and key card rank 10.
Player 2 has a hand of type rank 2 and key card rank 9.
Player 1 wins.
```