



“All In” Excel Challenge

Questions Appeared in: ModelOff 2012 Finals

Time Allocated: 75 minutes

SOLVING POKER HANDS

Using the rules provided in the accompanying workbook, you will need to analyze two 5 card poker hands to:

- Step 1. Sort each of the players' cards by value, highest to lowest (assume the ace is high);
- Step 2. Classify each of the players hands into one of the hands shown on Table 3; and
- Step 3. Identify the winner where the two 5 hard hands have the same classification;

Abbreviations

Each card is entered into an Excel cell by typing the value followed by the letter of the suit into a cell according to the following tables (eg KD, 9C, 4H). Card values are shown in descending order, except the Ace which can be allocated the value of 1 or 14 depending on the player's preference. (note that the only time an ace would be used as a low card is when completing a low end straight, eg. **A♥ 2♥ 3♠ 4♥ 5♠**)

Table 1: Suits

Suit	Abbreviation
Diamond ♦	D
Club ♣	C
Heart ♥	H
Spade ♠	S

Table 2: Value

Face Value	Rank	Abbreviation
Ace	14 or 1	A
King	13	K
Queen	12	Q
Jack	11	J
10	10	10
9	9	9
8	8	8
7	7	7
6	6	6
5	5	5
4	4	4
3	3	3
2	2	2



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Evaluating Hands

The winner is determined by scoring each of the 5 card hands against table 3 below (organized from highest to lowest) and allocating a score. The player who has the 5 card hand with the highest score is the winner. For instance if Player 1 has **A♦ K♦ Q♦ J♦** and **10♦** (Royal Flush) and Player 2 has **Q♣ 10♣ 7♣ 6♣ 4♣** (Flush), Player 1 wins as the Royal Flush has a higher score.

Where both players cards achieve the same score, for instance if both hands are scored as a Flush, then the winner is selected according to the Tie Breaker rules. Under the Tie Breaker rules for two Flushes, Player 1's **Q♣ 10♣ 7♣ 6♣ 4♣** beats Player 2's **Q♦ 10♦ 7♦ 5♦ 4♦**.

In some cases the Tie Breaker will not be able to identify a winner and the result will be a draw (also referred to as a dead heat). For instance, under the Two Pair rules Player 1's **10♦ 10♥ 4♥ 4♣ 3♠** would draw with Player 2's **10♠ 10♣ 4♣ 4♦ 3♥**.

Marking

In this question there are 25 potential outcomes that need to be tested (See the marking grid on the Mark sheet); candidates will be allocated 1 mark for each correctly identified outcome up to 20 and 2 marks for each correctly identified outcome above 20. The maximum score for the question is 30 marks.

To assist you, a marking macro has been integrated into the workbook. You can use the macro to quickly:

1. Identify hands for which your formulae and logic fail; or
2. Provide you with an indicative mark;

Marks are allocated for consistently identifying the strongest hand and the winning player for a particular scenario. Step 1 is optional as no marks are allocated to it, however it is recommended that candidates complete this step as the outcome is useful for steps 2 and 3.

Table 3: Hand Classification Table

Score	Hand Classification	Requirements	Ranking two hands of the same classification (Tie Breaker)	Draw possible?
10	Royal Flush	A straight flush is a hand that contains an Ace, King, Queen, Jack and Ten of the same suit such as A♦ K♦ Q♦ J♦ 10♦ .	If there are two royal flush's, the game is draw.	No
9	Straight Flush	A straight flush is a hand that contains five cards in sequence, all of the same suit such as Q♣ J♣ 10♣ 9♣ 8♣	Two straight flush are ranked by comparing the highest card of each.	Yes
8	Four of a Kind	Four of a kind is a poker hand such as 9♣ 9♠ 9♦ 9♥ J♥ , that contains all four cards of one rank	The Four of a kind with higher-ranking cards defeat lower-ranking ones. 9♣ 9♠ 9♦ 9♥ J♥ beats 7♠ 7♥ 7♦ 7♣ A♠	No



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7	Full House	A full house is a hand such as 3♣ 3♠ 3♦ 6♣ 6♥ , that contains three matching cards of one rank and two matching cards of another rank.	Between two full houses, the one with the higher-ranking three cards wins, so 7♠ 7♥ 7♦ 4♠ 4♣ defeats 6♠ 6♥ 6♦ A♠ A♣ .	No
6	Flush	A flush is a poker hand such as Q♣ 10♣ 7♣ 6♣ 4♣ , where all five cards are of the same suit.	The highest-ranking card of each is compared to determine the winner. If both hands have the same highest card, then the second highest-ranking card is compared, and so on until a difference is found.	Yes
5	Straight	A straight is a poker hand such as Q♣ J♠ 10♠ 9♥ 8♥ , that contains five cards of sequential rank.	Two straights are ranked by comparing the highest card of each.	Yes
4	Three of a Kind	Three of a kind is a poker hand such as 2♦ 2♠ 2♣ K♠ 6♥ that contains three cards of the same rank.	A higher-valued three-of-a-kind defeats a lower-valued three-of-kind, so Q♠ Q♥ Q♦ 7♠ 4♣ defeats J♠ J♣ J♦ A♦ K♠ .	No
3	Two Pair	A poker hand such as J♥ J♠ 4♠ 4♣ 9♥ , that contains two cards of the same rank, plus two cards of another rank.	To rank two hands both containing two pair, the higher-ranking pair of each is first compared, and the higher pair wins (so 10♠ 10♣ 8♦ 8♠ 4♥ defeats 8♥ 8♣ 4♠ 4♣ 10♥). If both hands have the same top pair, then the second pair of each is compared, such that 10♠ 10♣ 8♥ 8♠ 4♣ defeats 10♦ 10♥ 4♠ 4♥ Q♥ . If both hands have the same two pairs, the sole remaining unpaired card determines the winner. Where no difference is found we have a draw.	Yes
2	Pair	One pair is a poker hand such as 4♥ 4♠ K♠ 10♦ 5♠ , that contains two cards of one rank.	Higher-ranking pairs defeat lower-ranking pairs; if two hands have the same pair, the non-paired cards are compared in descending order to determine the winner. Where no difference is found we have a draw	Yes
1	High Card	A high-card is a poker hand such as K♥ J♥ 8♠ 7♦ 4♠ that is made of any five cards not meeting any of the requirements for other hands.	Two high-card hands are ranked by comparing the highest-ranking card. If those are equal, then the next highest-ranking card from each hand is compared, and so on until a difference is found. Where no difference is found we have a draw.	Yes