Question 4:

PAC Chart:

DATA GIVEN	REQUIRED RESULT(S)
→ Ranks of cards in Poker Hand.	→ Whether Poker Hand is Full House or not.
REQUIRED PROCESSING	**SOLUTION ALTERNATIVE(S)**
→ Take ranks of cards as input one by one and store each in separate variables. → Make two variables to store the two ranks of Full House. → Make two other variables to store how many cards each rank has, initialized with 0. → First card entered will be the first rank. → Second card, if not the same as first, will become the second rank. Otherwise, it will go to the pile of rank 1 (i.e there will be two cards in first rank). → For the remaining cards, they will first be compared with rank1. If equal, rank1's counter will increase, otherwise, it will be checked if rank2 is empty. In case it is empty, the rank of this card will be stored in rank2. If rank2 was not empty, the rank of current card will be compared with rank2, and if they're the same, rank2's counter will be incremented. → In the end, check if one rank has 3 cards and other one has 2, which if true means that the hand is Full House. Otherwise, hand is not Full House.	→ Instead of making piles of cards, we can individually compare the cards entered with each other to check if they make pairs of 2 and 3.

IPO Chart:

INPUT	PROCESS	MODULE REFERENCE	OUTPUT

→ Card1
→ Card2
→ Card3
→ Card4
→ Card5
	→ Prompt "Enter ranks of cards one by one"
	→ Take as input 5 ranks
	→ Take two variables to store ranks
	→ Take two counter variables for each rank, initialized with 0.
	→ Store Card1 in rank1
	→ Increment rank1Count
	→ Check if Card2 is equal to rank1, in which case increment rank1count
	→ Otherwise, store Card2 in rank2
	→ Increment rank2Count
	→ For Card3-Card5:
	1: Check if Card = rank1
	2: Increment rank1Count in above case
	3: Otherwise, check if rank2 is empty
	4: Set rank2 as Card in above case, and increment rank2Count
	5: Otherwise, check if rank2 = Card, in which case, increment rank2Count
	→ Check if (rank1Count = 3 AND rank2Count = 2) OR (rank1Count = 2 AND rank2Count = 3)
	→ Output "Full House" if above is true
	→ Otherwise, output "Not Full House"
		PRINT
		INPUT
		SET
		SET
		SET
		INCREMENT
		IF – THEN
		INCREMENT
		ELSE
		SET
		INCREMENT
		IF – THEN
		INCREMENT
		ELSE
		SET
		INCREMENT
		ELSE
		IF – THEN
		INCREMENT
		IF – THEN
		PRINT
		ELSE
		PRINT
			"Hand is Full House" Or "Hand is not Full House", depending on circumstances.

Algorithm:

Step 1: Ask the user to enter the ranks of cards in hand.

Step 2: Take the ranks as input and store each in separate variable.

Step 3: Take two integer variables to store the two ranks of Full House (rank1 & rank2), and two others to keep count of how many cards are in each rank, initialized with 0 (rank1Count & rank2Count).

Step 4: rank1 becomes Card1, and rank1Count is incremented.

Step 5: If Card2 is same as rank1, rank1Count is incremented, otherwise rank2 becomes Card2 and rank2Count is incremented.

Step 6: If Card 3 is same as rank1, rank1Count is incremented. Otherwise, check if rank2Count is 0, in which case rank2 will become Card 3 and rank2Count will be incremented. If rank2Count is not 0, Card 3 is compared with rank2, and rank2Count is incremented if Card 3 and rank2 are same.

Step 7: Repeat Step 6 for Card 4 and Card 5 as well.

Step 8: Check if rank1Count is 3 and rank2Count is 2 or vice versa.

Step 9: Output “Full House” if above mentioned condition is true, otherwise output “Not Full House”.

Pseudocode:

01. START

02. SET rank1Count = 0

03. SET rank2Count = 0

04. PRINT "Enter the ranks of your Poker Hand one by one"

05. PRINT "Rank of Card 1: "

06. INPUT card1

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07. PRINT "Rank of Card 2: "
08. INPUT card2
09. PRINT "Rank of Card 3: "
10. INPUT card3
11. PRINT "Rank of Card 4: "
12. INPUT card4
13. PRINT "Rank of Card 5: "
14. INPUT card5
15. SET rank1 = card1
16. INCREMENT rank1Count
17. IF card2 = rank1 THEN
18.     INCREMENT rank1Count
19. ELSE
20.     SET rank2 = card2
21.     INCREMENT rank2Count
22. ENDIF
23. IF card3 = rank1 THEN
24.     INCREMENT rank1Count
25. ELSE
26.     IF rank2Count = 0 THEN
27.         SET rank2 = card3
28.         INCREMENT rank2Count
29.     ELSE IF card3 = rank2 THEN
30.         INCREMENT rank2Count
31.     ENDIF
32. ENDIF
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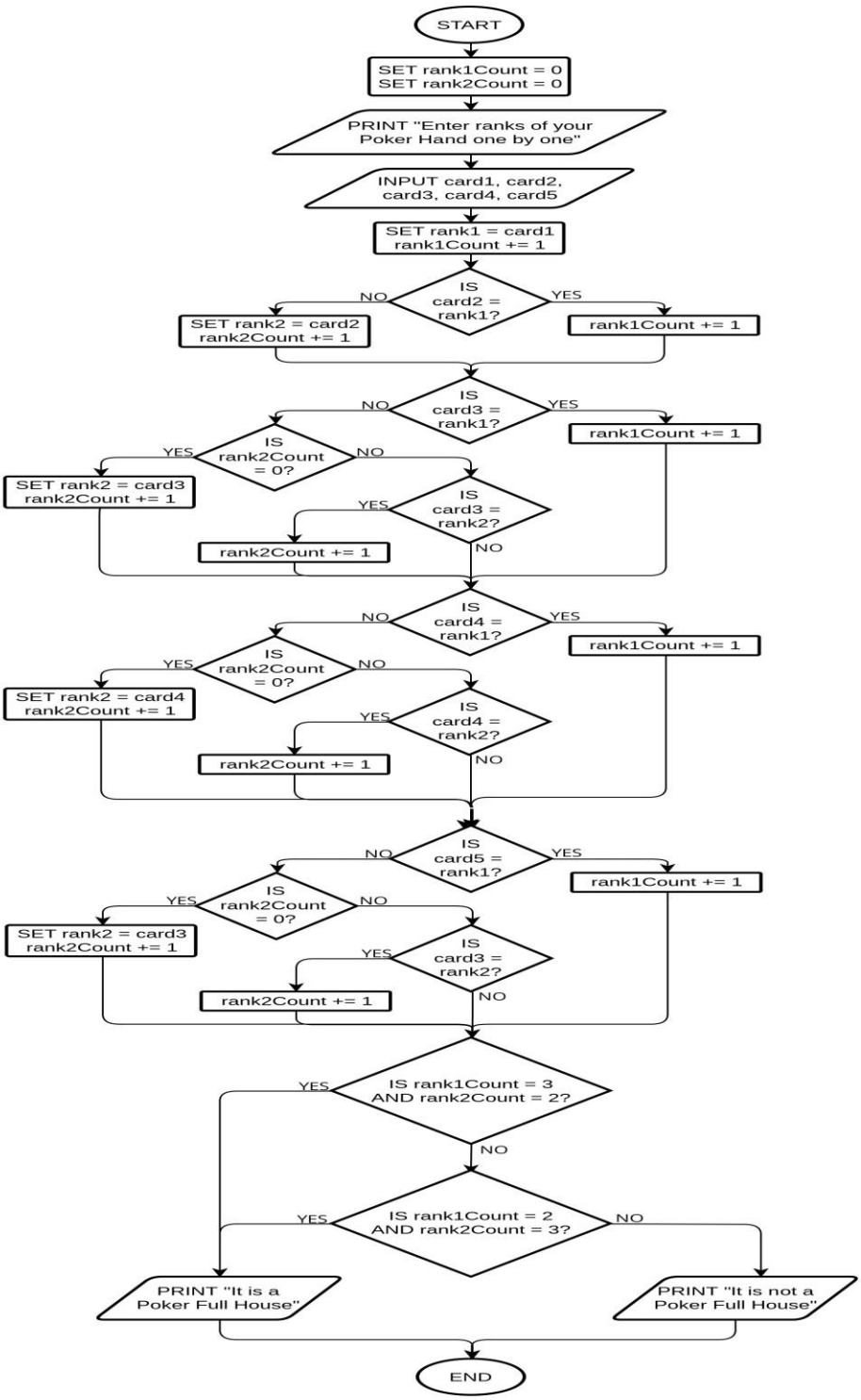
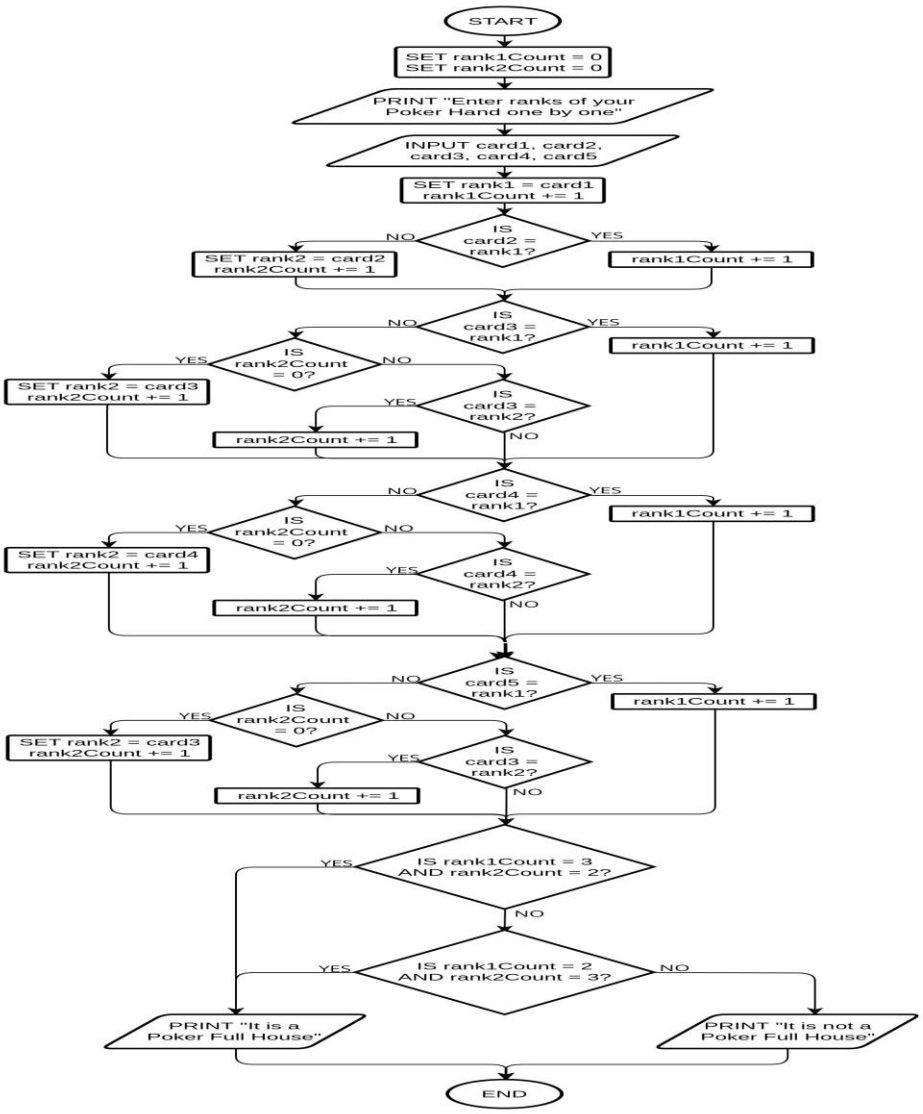
33. IF card4 = rank1 THEN
34.     INCREMENT rank1Count
35. ELSE
36.     IF rank2Count = 0 THEN
37.         SET rank2 = card4
38.         INCREMENT rank2Count
39.     ELSE IF card4 = rank2 THEN
40.         INCREMENT rank2Count
41.     ENDIF
42. ENDIF
43. IF card5 = rank1 THEN
44.     INCREMENT rank1Count
45. ELSE
46.     IF rank2Count = 0 THEN
47.         SET rank2 = card5
48.         INCREMENT rank2Count
49.     ELSE IF card5 = rank2 THEN
50.         INCREMENT rank2Count
51.     ENDIF
52. ENDIF
53. IF (rank1Count=3 AND rank2Count=3) OR (rank1Count=2 AND rank2Count=3) THEN
54.     PRINT "This is a Poker Full Hand!"
55. ELSE
56.     PRINT "This is not a Poker Full Hand!"
57. ENDIF
58. END
```

Flowchart:


START
SET rank1Count = 0
SET rank2Count = 0
PRINT "Enter ranks of your Poker Hand one by one"
INPUT card1, card2, card3, card4, card5
SET rank1 = card1
rank1Count += 1
IS card2 = rank1?
NO
YES
SET rank2 = card2
rank2Count += 1
rank1Count += 1
IS card3 = rank1?
NO
YES
rank1Count += 1
IS rank2Count = 0?
YES
NO
SET rank2 = card3
rank2Count += 1
IS card3 = rank2?
YES
rank2Count += 1
NO
IS card4 = rank1?
NO
YES
rank1Count += 1
IS rank2Count = 0?
YES
NO
SET rank2 = card4
rank2Count += 1
IS card4 = rank2?
YES
rank2Count += 1
NO
IS card5 = rank1?
NO
YES
rank1Count += 1
IS rank2Count = 0?
YES
NO
SET rank2 = card3
rank2Count += 1
IS card3 = rank2?
YES
rank2Count += 1
NO
IS rank1Count = 3 AND rank2Count = 2?
YES
NO
IS rank1Count = 2 AND rank2Count = 3?
YES
NO
PRINT "It is a Poker Full House"
PRINT "It is not a Poker Full House"
END


START
SET rank1Count = 0
SET rank2Count = 0
PRINT "Enter ranks of your Poker Hand one by one"
INPUT card1, card2, card3, card4, card5
SET rank1 = card1
rank1Count += 1
IS card2 = rank1?
NO
YES
SET rank2 = card2
rank2Count += 1
rank1Count += 1
IS card3 = rank1?
NO
YES
rank1Count += 1
IS rank2Count = 0?
YES
NO
SET rank2 = card3
rank2Count += 1
IS card3 = rank2?
YES
rank2Count += 1
NO
IS card4 = rank1?
NO
YES
rank1Count += 1
IS rank2Count = 0?
YES
NO
SET rank2 = card4
rank2Count += 1
IS card4 = rank2?
YES
rank2Count += 1
NO
IS card5 = rank1?
NO
YES
rank1Count += 1
IS rank2Count = 0?
YES
NO
SET rank2 = card3
rank2Count += 1
IS card3 = rank2?
YES
rank2Count += 1
NO
IS rank1Count = 3 AND rank2Count = 2?
YES
NO
IS rank1Count = 2 AND rank2Count = 3?
YES
NO
PRINT "It is a Poker Full House"
PRINT "It is not a Poker Full House"
END