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**A = 1 -3 6 B = 1 1 2 C = 0 4 3**

 **4 0 2 1 -2 1 6 -7 1**

 **8 5 1 0 3 -4 1 -3 2**

**Question 1**

1. **Rank of A**

**/A/ =** 1 -3 6

4 0 2

 8 5 1

**/A/ =**  1 0 2 - (-3) 4 2 +6 4 0

 5 1 8 1 8 5

**/A/ =** 1[0 – 10] + 3[4 – 16] + 6[20 - 0]

**/A/ =** - 10 – 36 + 120

**/A/ =** 74

Since **/A/ ≠ 0**, the rank of the matrix A is 3

1. **Rank of B transpose**

**/BT/ =** 1 1 0

1 -2 3

 2 1 -4

**/BT/ =**  1 -2 3 - 1 1 3 + 0 1 -2

1 -4 2 -4 2 1

**/BT/ =**  1[8 – 3] – 1 [-4 – 6] + 0[ 1 –(-4)]

**/BT/ =** 5 + 10 + 0

**/BT/ =** 15

Since **/BT/ ≠ 0**, the rank of the matrix BT is 3

1. **Rank of (A + C) transpose**

**(A + C) =** 1 -3 6 **+** 0 4 3

 4 0 2 6 -7 1

 8 5 1 1 -3 2

**(A + C) =** 1 1 9

10 -7 3

 9 2 3

**(A + C)T =** 1 10 9

1 -7 2

 9 3 3

**/A + C/ T =** 1 10 9

1 -7 2

 9 3 3

**/A + C/ T  =** 1 -7 2 -10 1 2 +9 1 -7

3 3 9 3 9 3

**/A + C/T =** 1[- 21 – 6] -10[3 – 18] +9[3 –(-63)]

**/A + C/T =** -27 + 150 + 594

**/A + C/T =**  717

Since **/A + C/T ≠ 0**, then the rank of matrix (A + C)T is 3

1. **Rank of (B + C)**

**(B + C) =** 1 1 2 **+** 0 4 3

1 -2 1 6 -7 1

 0 3 -4 1 -3 2

**(B + C) =** 1 5 5

 7 -9 2

 1 0 -2

**/B + C/ =** 1 5 5

 7 -9 2

 1 0 -2

**/B + C/ =** 1 -9 2 - 5 7 2 + 5 7 -9

0 -2 1 -2 1 0

**/B + C/ =** 1[ 18 – 0] – 5[ -14 -2] +5[ 0 –(-9)]

**/B + C/ =** 18 + 80 + 45

**/ B + C/ =** 143

Since **/B + C/ ≠ 0**, then the rank of the matrix (B + C) is 3

1. **Rank of (A + B + C)**

**(A + B + C) =** 1 -3 6 **+** 1 1 2 **+** 0 4 3

4 0 2 1 -2 1 6 -7 1

 8 5 1 0 3 4 1 -3 2

**(A + B + C) =** 2 2 11

11 -9 4

 9 5 -1

**/A + B + C/ =** 2 2 11

11 -9 4

 9 5 -1

**/A + B + C/ =** 2 -9 4 - 2 11 4 + 11 11 -9

5 -1 9 -1 9 5

**/A + B + C/ =** 2[9 – 20] – 2[-11 -36] + 11[55 + 81]

**/A + B + C/ =** -22 + 94 + 1496

**/A + B + C/ =** 1568

Since **/A + B + C/ ≠ 0**, then the rank of the matrix (A + B + C) is 3