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**SOLUTION**

**X= 1 2 8 Y= 0 5 0**

 **4 7 6 -3 -7 -1**

 **9 5 3 2 1 9**

1. **Whether X is singular or non-singular**

X = 1 2 8

 4 7 6

 9 5 3

= **1**  7 6 **-2**  4 6 **+8** 4 7

 5 3 9 3 9 5

= 1(21-30) -2(12-54) +8(20-63)

= =9 +84 -344

= **-269**

**Since** X ≠ 0 , then X is a non-singular matrix

1. **Whether Y is singular or non-singular**

Y = 0 5 0

 -3 -7 -1

 2 1 9

= **0** -7 -1 **-5** -3 -1 **+0** -3 -7

 1 9 2 9 2 1

0(-63+1) -5(-27+2) +0(-3+14)

= 0 -5(-25) + 0

**=125**

**Since** Y ≠ 0 , then **Y** is a non-singular matrix

1. **Rank of Y**

Y = 0 5 0

 -3 -7 -1

 2 1 9

= **0**  -7 -1 **-5** -3 -1 +0 -3 -7

 1 9 2 9 2 1

0(-63+1) -5(-27+2) +0(-3+14)

= 0 -5(-25) + 0

**=125**

Since Y ≠ 0 **, Hence the rank of Y is 3**

1. **Whether X+Y is singular or non-singular**

X+Y= 1 2 8 0 5 0 **1 7 8**

 4 7 6 + -3 -7 -1 = **1 0 5**

 9 5 3 2 1 9 **11 6 12**

= **1** 0 5 **-7** 1 5 **+8** 1 0

 6 12 11 12 11 6

= 1(0 – 30) -7(12 – 55) +8( 6 – 0)

= -30 +301 + 48

= **319**

Hence, **X + Y is a non-singular matrix**

1. **Whether 5Y is singular or non- singular**

5Y= 5 0 5 0 **0 25 0**

 -3 - 7 -1 = -**15 -35 -5**

 2 1 9  **10 5 45**

= **0** -35 -5 **-25**  -15 -5 +0 -15 -35

 5 45 10 45 10 5

= 0( -1575 + 25) -25 (-675 + 50) +0( -75 + 350)

=**15,625**

**Since, 5Y ≠ 0 Hence , 5Y is a non- singular matrix**

 Domain Co-domain

m**.**

h**.**

i**.**

k**.**

o**.**

r**.**

c**.**

**.**1

**.**3

**.**5

**.**7

**.**9

2.

 **Q T R**

From the diagram we see that

T(m)= T(i) = 1

T(h) = 3

T(k) = 5

T(o)= T(c)= 9