Week 4 Math Assignment

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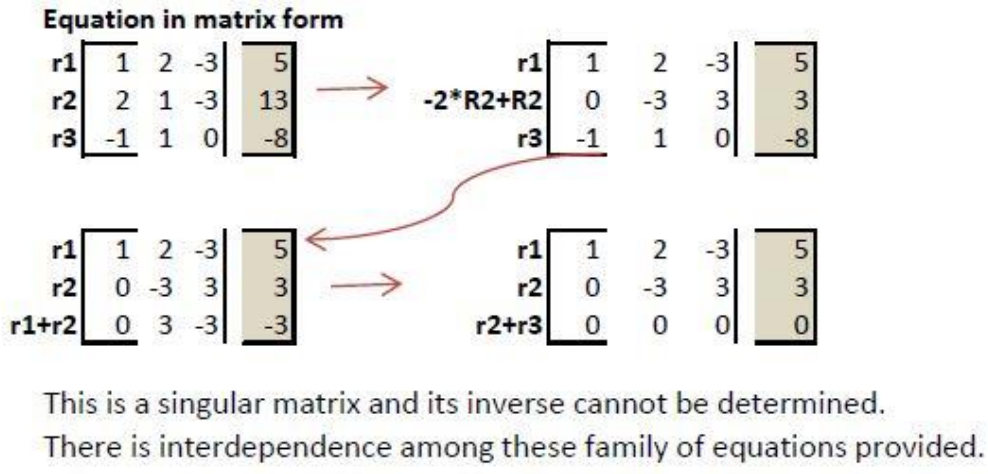
1. Using matrix operations, describe the solutions for the following family of equations:

x + 2y - 3z = 5
2x + y - 3z = 13
-x + y = -8



This is a singular matrix and its inverse cannot be determined.
There is interdependence among these family of equations provided.

2. Provide a solution for #1, using R functions of your choice.

```
A <- matrix(c(1,2,-3,2,1,-3,-1,1,0), nrow=3, ncol=3, byrow=TRUE)
B <- matrix(c(5,13,-8))
solve(A,B)
```

```
## Error in solve.default(A, B): Lapack routine dgesv: system is exactly sing
ular: U[3,3] = 0
```

3. Solve for AB by hand:

$$A = \begin{bmatrix} 4 & -3 \\ -3 & 5 \\ 0 & 1 \end{bmatrix}, \qquad B = \begin{bmatrix} 1 & 4 \\ 3 & -2 \end{bmatrix}$$

$$AB = \begin{bmatrix} (4*1)+(-3*3) & (4*4)+(-3*-2) \\ (-3*1)+(5*3) & (-3*4)+(5*-2) \\ (0*1)+(1*3) & (0*4)+(1*-2) \end{bmatrix} = \begin{bmatrix} 4-9 & 16+6 \\ -3+15 & -12-10 \\ 0+3 & 0-2 \end{bmatrix} = \begin{bmatrix} -5 & 22 \\ 12 & -22 \\ 3 & -2 \end{bmatrix}$$

4. Solve AB from #3 using R functions of your choice.

```
A <- matrix(c(4,-3,-3,5,0,1),nrow=3, ncol=2, byrow=TRUE)
B <- matrix(c(1,4,3,-2), nrow=2, ncol=2, byrow=TRUE)
AB <- A %*% B
AB
```

```
##      [,1] [,2]
## [1,]   -5   22
## [2,]   12  -22
## [3,]    3   -2
```