Practicing exercises-3

1. Let be given the following matrices:

$$A=\begin{bmatrix}1 & 2 & 0\\ 0 & 1 & 0\end{bmatrix} \quad ; \quad B=\begin{bmatrix}1 & -1\\ 0 & 2\\ 2 & 0\end{bmatrix} \quad ; \quad C=\begin{bmatrix}1 & 2\\ 1 & 3\end{bmatrix}$$

Find the matrices if they exist: *AB* ; *AC* ; *AB+C* ; *BA* ; *BA+2C*; ; C^{-1} ; $(AB)^{-1}$

2. Give the solution set of the following linear systems

a.) $$\begin{aligned} x &+ 3y - z = 2\\ -3x &- 8y - 5z = 1\\ -x &+ y + 2z = -7\end{aligned}$$

b.) $$\begin{aligned} x &+ 3y - z = 2\\ -3x &- 8y - 5z = 1\\ 2x &+ 6y - 2z = 1\end{aligned}$$

3. For which values of *a* and *b* has the following system of equations

$$\begin{aligned} x &+ 2y - z = 1\\ 2x &+ a\cdot y + z = b\\ -x &- y + 2z = 5\end{aligned}$$

a.) no solution
b.) exactly one solution
c.) infinitely many solutions
d.) Find the solution set, if a=2 and b=5 !

Theoretical questions

1.) Show that the substitution $t=\tan\left(\frac{x}{2}\right)$ rationalizes the integral $\int \frac{1}{2\sin x-\cos x}dx$

2.) Let be given the matrix $A=\begin{bmatrix}a & b\\ c & d\end{bmatrix}$ where $\det(A)=a\cdot d-c\cdot b\neq 0$

Show that $A^{-1}=\frac{1}{\det(A)}\cdot\begin{bmatrix}d & -b\\ -c & a\end{bmatrix}$