

Birzeit University
Mathematics Department
Math 234

Homework (1) (for chapters 1 & 2)

Second Semester 2019/2020

Deliver the solution as one pdf-file using ritaj messages. File name should be studentNumber-HW1-Math234.pdf

Chapter One

Question 1. Solve the system

$$\begin{aligned}x_1 - x_2 + 3x_3 + 2x_4 &= 1 \\-x_1 + x_2 - 2x_3 + x_4 &= -2 \\2x_1 - 2x_2 + 7x_3 + 7x_4 &= 1\end{aligned}$$

Question 2. Consider the system

$$\begin{aligned}3x_1 - x_2 + ax_3 &= 1 \\x_1 + 3x_2 + 2x_3 &= -b \\x_1 - 2x_2 + 2x_3 &= 4\end{aligned}$$

1. For what values of a, b will the system be inconsistent?
2. For what values of a, b will the system have only one solution?
3. For what values of a, b will the saystem have infinitely many solutions?

Question 3. Find A^{-1} (if exists), where $A = \begin{pmatrix} 1 & 4 & 5 \\ -3 & -1 & -2 \\ 2 & 3 & 4 \end{pmatrix}$

Question 4. State 4 equivalent conditions for a matrix A to be nonsingular

Chapter Two

Question 5. Let A, B, C be $n \times n$ -matrices, S is nonsingular. If $A = S^{-1}BS$, show that $\det(A) = \det(B)$

Question 6. For what values of k is the matrix $A = \begin{pmatrix} 2-k & -1 \\ -1 & 2-k \end{pmatrix}$ singular?

Question 7. If $\det \begin{pmatrix} a & b & c \\ d & e & f \\ g & h & i \end{pmatrix} = 2$. Find $\det \begin{pmatrix} 2g & 2h & 2i \\ -d & -e & -f \\ 2a & 2b & 2c \end{pmatrix}$

Question 8. Let $A = \begin{pmatrix} 3 & -1 & 2 \\ 1 & 4 & 5 \\ 0 & 3 & 2 \end{pmatrix}$

1. Find $\text{adj}(A)$
2. Find $\det(A)$
3. Find A^{-1}