

Math G2 Mock midterm 1

1. Calculate the following determinants! (3+2 points)

a) (Practice 1. Ex. 7.)

$$\begin{vmatrix} 1 & 1 & 1 & 1 \\ 1 & 2 & 3 & 4 \\ 1 & 3 & 6 & 10 \\ 1 & 4 & 10 & 20 \end{vmatrix},$$

b) (Practice 1. Ex. 9.)

$$\det \left\{ \left[\begin{pmatrix} 4 & 3 \\ 1 & 3 \end{pmatrix} \cdot \begin{pmatrix} 1 & -2 \\ -3 & 2 \end{pmatrix} \right]^3 \right\}.$$

2. (Practice 2. Ex. 1.) Does the following matrix have an inverse? If yes, calculate it using one of the methods we learned. (5 points)

$$A = \begin{pmatrix} 1 & 2 & 1 \\ 4 & 3 & -2 \\ -5 & -4 & -1 \end{pmatrix}$$

3. (Practice 3. Ex. 4.) Solve the following SLAE! How many solutions does it have depending on the value of λ ? (5 points)

$$\begin{cases} \lambda x_1 + x_2 + x_3 + x_4 = 1, \\ x_1 + (1 + \lambda)x_2 + x_3 + x_4 = 3, \\ x_1 + x_2 + (1 + \lambda)x_3 + x_4 = 4, \\ x_1 + x_2 + x_3 + x_4 = 1. \end{cases}$$

4. (Practice 4. Ex. 5.) Calculate the eigenvalues and eigenvectors of the following matrix! (5 points)

$$A = \begin{pmatrix} 6 & 0 & 2 \\ 0 & -2 & 0 \\ -2 & 0 & 6 \end{pmatrix}$$