

Assignment Matlab Lab2

(Use m-file for the assignment)

1. Populations tend to expand as $P = P_0e^{rt}$, where P is the current population, P_0 is the original population, r is the rate, expressed as a fraction, t is the time.

If you originally have 100 rabbits that breed at a rate of 9% per year, find how many rabbits you will have at the end of 10 years.

2. Create the following matrix **A**:

$$A = \begin{bmatrix} 3.4 & 2.1 & 0.5 & 6.5 & 4.2 \\ 4.2 & 7.7 & 3.4 & 4.5 & 3.9 \\ 8.9 & 8.3 & 1.5 & 3.4 & 3.9 \end{bmatrix}$$

(a) Create a matrix **B** by extracting the first column of matrix **A**.

(b) Create a matrix **C** by extracting the second row of matrix **A**.

(c) Use colon operator to create a matrix **D** by extracting the first through third columns of matrix **A**.

(d) Create a singled valued matrix **E** by extracting the value from second row, third column of matrix **A** i.e. $A_{2,3}$.

(e) Create a matrix **F** by extracting the values of elements $A_{1,3}$, $A_{2,4}$, and $A_{3,5}$ and combining them into a single matrix.

3. Compute the total mass of the following components, using a dot product:

Component	Density	Volume
Propellant	1.2 g/cm ²	700 cm ²
Steel	7.8 g/cm ²	200 cm ²
Aluminum	2.7 g/cm ²	300 cm ²

4. Solve the following systems of equations using both the matrix left division and inverse matrix methods:

(a) $-2x + y = -3$; $x + y = 3$;

(b) $10x - 7y = 7$; $-3x + 2y + 6z = 4$; $5x + y + 5z = 6$;

(c) $x + 4y - z + w = 2$; $2x + 7y + z - 2w = 16$; $x + 4y - z - 2w = -15$; $3x - 10y - 2z + 5w = -14$;

5. Given the array $\mathbf{A} = [-1, 3; 4, 2]$, raise \mathbf{A} to second power by array exponentiation (same as element-by-element). Raise \mathbf{A} to second power by matrix exponentiation. Explain why the answers are different.