**In-lab Tasks**

**Task 01: Are the following true or false? Assume A is a generic n×n matrix. Please provide a proper reasoning for your answer.**

(a) **Aˆ(-1)** equals **1/A**

(b) **A.ˆ(-1**) equals **1./A**

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| **Part (a):**  This is **False**    Here A is a square matrix. A^(-1) here this expression means we are taking the inverse of matrix A. The expression 1/A is wrong because we cannot divide a number by a matrix  So therefore A^(-1) is not equal to 1/A  **Part (b):**  This is **True**    In MATLAB whenever we put a period before any mathematical operator it means we want to perform that operation not on the whole matrix but we want to perform that operation on each individual entry of that matrix. **A.^(-1)** here this expression means that we are taking inverse of each individual entry of matrix. In the expression **1./A** the same thing is happening.  Therefore **A.^(-1)** =**1./A** |

**Task 02: Vector Generation**

1. **Generate the following vectors:**

**A = [1 0 4 5 3 9 0 2]**

**a = [4 5 0 2 0 0 7 1]**

**Note: Be aware that Matlab are case sensitive. Vector A and a have different values.**

1. **Generate the following vectors:**

**B = [A a]**

**C = [a, A]**

1. **Generate the following vectors using function zeros and ones:**

**D = [0 0 0 . . . 0] with fifty 0’s.**

**E = [1 1 1 . . . 1] with a hundred 1’s.**

1. **Generate the following vectors using the colon operator**

**F = [1 2 3 4 . . . 30]**

**G = [25 22 19 16 13 10 7 4 1]**

**H = [0 0.2 0.4 0.6 . . . 2.0]**

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| **Part (a):**    **Part (b):**    **Part (c):**    **Part(d):** |

**Task 03: Operate with the vectors**

**V1 = [1 2 3 4 5 6 7 8 9 0]**

**V2 = [0.3 1.2 0.5 2.1 0.1 0.4 3.6 4.2 1.7 0.9]**

**V3 = [4 4 4 4 3 3 2 2 2 1]**

1. **Calculate, respectively, the sum of all the elements in vectors V1, V2, and V3.**
2. **How to get the value of the fifth element of each vector? What happens if we execute the command V1(0) and V1(11)? Remember if a vector has N elements, their subscripts are from 1 to N.**
3. **Generate a new vector V4 from V2, which is composed of the first five elements of V2. Generate a new vector V5 from V2, which is composed of the last five elements of V2.**
4. **Derive a new vector V6 from V2, with its 6th element omitted. Derive a new vector V7 from V2, with its 7th element changed to 1.4. Derive a new vector V8 from V2, whose elements are the 1st, 3rd, 5th, 7th, and 9th elements of V2.**
5. **What are the results of**

**9-V1, V1\*5, V1+V2, V1-V3, V1.\*V2, V1\*V2, V1.^2, V1.^V3, V1^V3**

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| **Part (a):**    **Part (b):**      **Part (c):**    **Part (d):**        **Part (e):** |

**Task 04: Suppose p is a row vector such that p=[4 2 3 1]. What does this line do? Please provide a detailed answer stepwise**

**[length(p)-1:-1:0] .\* p**

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| 1. First we find the length of vector **p** which is 4. 2. Then we make a vector whose first entry is length of vector **p** -1 and last entry is 0 with a decrement of -1 in between. 3. Then we multiply each entry of this vector with the entry of vector **p**. |

**Task 05: Suppose A is any matrix. What does this statement do? Please provide a reasonable reason.**

**A(1:size(A,1)+1:end)**

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| **Reason:** |

**Task 06: Try to avoid using unnecessary brackets in an expression. Can you spot the errors in the following expression? (Test your corrected version with MATLAB.)**

**(2(3+4)/(5\*(6+1))ˆ2**

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**Task 07: Set up a vector n with elements 1, 2, 3, 4, 5. Use MATLAB array operations on it to set up the following four vectors, each with five elements:**

**(a) 2, 4, 6, 8, 10**

**(b) 1/2, 1, 3/2, 2, 5/2**

**(c) 1, 1/2, 1/3, 1/4, 1/5**

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| **Part (a):**    **Part (b):**    **Part (c):** |

**Task 08: Suppose vectors a and b are defined as follows:**

**a = [2 –1 5 0];**

**b = [3 2 –1 4];**

**Evaluate by hand the vector c in the following statements. Check your answers with MATLAB.**

**(a) c = a – b;**

**(b) c = b + a – 3;**

**(c) c = 2 \* a + a .ˆ b;**

**(d) c = b ./ a;**

**(e) c = b . a;**

**(f) c = a .ˆ b;**

**(g) c = 2.ˆb+a;**

**(h) c = 2\*b/3.\*a;**

**(i) c = b\*2.\*a;**

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**Task 09: Make a vector v=[1 2 3 4 5 6 7 8 9 10], develop an algorithm such that the first element of the vector is multiplied by length(v), second element by length(v)-1and similarly the last element i.e. 10 is multiplied by length(v)-9. The final vector should be f=[10 18 24 28 30 30 28 24 18 10]. The algorithm devised should only use the length of vector v to achieve vector f.**

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**Task 10: (a) Make a matrix M1 which consists of two rows and three columns and all the entries in the matrix are ones.**

**(b) Make a vector V1 consisting of three zeros.**

**(c) Make a 3x3 matrix M2 in which the diagonal entries are all fives.**

**(d) Now make a matrix M3 from M1, M2 and V1 which look like the matrix given below**

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**(e) Now use the referencing element concept to make three vectors V2, V3 and V4 such that V2 consists of first row of M3, V3 consists of second row of M3 and V4 consists of third row of M3.**

**(f) Now alter the fourth entry of vectors V2, fifth entry of V3 and sixth entry of V4 to 1.4 and make a new vector M4 which looks like the matrix given below.**

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| **Part (a):**    **Part (b):**    **Part (c):**    **Part (d):**    **Part (e):**        **Part (f):** |

**Post-lab Task**

**Critical Analysis / Conclusion**

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| In this lab we learned the use of the software MATLAB. We learned basics built in functions of MATLAB. We learned how to perform mathematical operations on Vectors and Matrices. MATLAB is a programming software that is used to solve complex mathematical problems and plot graphs of different functions. |