**Applied Mathematics –Practical**

**SY BTECH**

**Programming Assignment 2: Introduction to MATLAB**

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| **Que. No.** | **Question Description** | **Marks** | **CO No.** |
| **1-19** | **Develop code in MATLAB to solve the given problem.**  Every student is assigned the specific problem.  Assigned roll number is shown in the bracket. Follow the template for submission of assignment. Read the rubrics carefully and then submit.  (List of problems along with submission template are attached).  File should be named as **School\_Block\_Roll no\_Name\_PR2** | **10** | **6** |

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| --- | --- | --- | --- | --- |
| **Criteria** | **Ratings** | | | **Score** |
| **Algorithm** | Logical understanding of the problem is excellent (2) | Logical understanding of the problem is not so good (1) | Logical understanding of the problem is poor (0) | 2 |
| **Error debugging** | Step by step error debugging mentioned properly in template (2) | Step by step error debugging mentioned but not proper in template (1) | Step by step error debugging not mentioned (0) | 2 |
| **Correctness of the code** | Code is written with proper description & indention and output is correct  (2) | Code is written with no proper description & indention but output is correct  (1) | Code is written with no proper description & indention but output is incorrect  (0) | 2 |
| **Instructions and template followed** | Followed properly (2) | Partially followed (1) | Not followed (0) | 2 |
| **Q-A to check code is done by own** | Found that code is developed by own (2) | Found that code is not developed by own (0) | | 2 |
| **Total Score** | | | | **10** |

**List of Problems along with assigned roll number:**

* Write a function called intquad that takes as its input arguments two scalar positive integers named n and m in that order. The function returns Q, a 2n-by-2m matrix. Q consists of four n-by-m submatrices. The elements of the submatrix in the top left corner are all 0s, the elements of the submatrix at the top right are 1s, the elements in the bottom left are 2s, and the elements in the bottom right are 3s.
* Write a function called sindeg that takes a matrix input called deg. The function returns a matrix of the same size as deg with each of its elements containing the sine of the corresponding element of deg. Note that the elements of deg are given in degrees and not radians. As a second output, the function returns a scalar that contains the average value of the first output. You are not allowed to use the sind and cosd built-in functions, but the use of any other function is acceptable.
* Write a function called simple\_stats that takes a matrix N as an input and returns the matrix S as the output. S has the same number of rows as N. Each element of the first column of S contains the mean of the corresponding row of N. Similarly, the second column contains the median values; while the third column has the minimums. Finally, each element of the fourth column of S is equal to the maximum value of given row of N. (Hint: Remember, help is your friend.)
* An insurance company follows following rules to calculate premiums
* If the male is healthy and in between 25 and 35 years of age living then premium is Rs 4 per 1000/- and its policy cannot exceed 200000/-
* If the female is healthy and In between 25 and 35 years of age living then premium is Rs 3 per 1000/- and policy amount cannot exceed more than 100000/-
* If the male is unhealthy and in between 25 to 35 year of age living then premium is Rs 6 per1000/- and the policy amount cannot exceed more than 10000/-
* In all the other cases person is not insured.

Implement a program that decide whether a person is insured or not when user enters the person the detail, if insurance display his premium policy rate and max. Amount to which they can be insured.

* Write a function called odd\_rms that returns orms, which is the square root of the mean of the squares of the first nn positive odd integers, where nn is a positive integer and is the only input argument. For example, if nn is 3, your function needs to compute and return the square root of the average of the numbers 1, 9, and 25. You may use built-in functions including, for example, sum and sqrt, except for the built-in function rms, which is not allowed.
* Write a function called fence that takes two scalar inputs: lng, the length of a straight fence we need to build and seg, the length of one segment of fencing material. A segment needs to have a pole at both ends, but two neighboring segments always share a pole. The function returns two scalar outputs: the number of segments we need for the given length of fence and the number of poles needed. Note that a segment can be cut shorter if needed. For example, to build a 75m long straight fence using 10m segments, we need 8 segments. You may find the ceil built-in function handy
* Write a function called zero\_stat that takes a matrix as an input that only has 0 and 1 elements. The function needs to compute and return the percentage of 0 elements in the matrix. For example, if there are 10 zeros and 15 ones in a 5-by-5 matrix that is provided as an input to zero\_stat, it would return 40 because 40% of the elements are zero.
* Each number on telephone keypads, except 0 and 1, corresponds to a set of uppercase letters as shown in this list:

2 ABC, 3 DEF, 4 GHI, 5 JKL, 6 MNO, 7 PQRS, 8 TUV, 9 WXYZ

Hence, a phone-number specification can include uppercase letters and digits. Write a function called dial that takes as its input argument a char vector of length 16 or less that includes only these characters and returns as its output argument the telephone number as a uint64. Here is the input and output for one example of a call of the function:

Input: '1FUNDOG4YOU'

Output: 13863644968

You can assume that a phone number never starts with 0. If the input contains any illegal characters, the function returns 0. You are not allowed to use the built-in function strrep.

* If we list all the natural numbers up to 15 that are multiples of 3 or 5, we get 3, 5, 6, 9, 10, 12 and 15. The sum of these multiples is 60. Write a function called sum3and5muls that returns the sum of all the unique multiples of 3 or 5 up to n where n is a positive integer and the only input argument of the function.
* Write a function called eligible that helps the admission officer of the Graduate School of Vanderbilt University decide whether the applicant is eligible for admission based on GRE scores. The function takes two positive scalars called v and q as input. They represent the percentiles of the verbal and quantitative portions of the GRE respectively. You do not need to check the input. The applicant is eligible if the average percentile is at least 92% and both of the individual percentiles are over 88%. The function returns the logical true or false.
* Write a function called fare that computes the bus fare one must pay in a given city based on the distance travelled. Here is how the fare is calculated: the first mile is $2. Each additional mile up to a total trip distance of 10 miles is 25 cents. Each additional mile over 10 miles is 10 cents. Miles are rounded to the nearest integer other than the first mile which must be paid in full once a journey begins. Children 18 or younger and seniors 60 or older get a 20% discount. The inputs to the function are the distance of the journey and the age of the passenger in this order. Return the fare in dollars, e.g., 2.75 would be the result returned for a 4-mile trip with no discount.
* Write a code to find the square root of the mean of the squares of the first n positive odd integers, where n is a positive integer and is the only input. For example, if n is 3, your code needs to compute the square root of the average of the numbers 1, 9, and 25. You may use built-in functions including, for example, sum and sqrt, except for the built-in function rms, which is not allowed.
* College library has fixed charge for first three days and additional charge for each day thereafter, Mahesh paid Rs. 27 for a book kept for seven days while Sumit paid Rs. 21 for the book he kept for 5 days. Evaluate the fixed charges and charge for each extra day.
* In order to process a customer’s order e- company are having the following rules:
* If order placed by customer is less or equal to stock and has sufficient credit in his valet then order will be supplied within first three days.
* If the order is place by customer is more than that in stock and has sufficient credit in his valet then intimate the customer that remaining order will take extra 3 days.
* If the credit is insufficient then intimate that order cannot be placed.
* Write a function called sort3 that takes a 3-element vector as its sole arguments. It uses if-statements, possibly nested, to return the three elements of the vector as three scalar output arguments in non-decreasing order, i.e., the first output argument equals the smallest element of the input vector and the last output argument equals the largest element. NOTE: Your function may not use any built-in functions, e.g., sort, min, max, median, etc.

16. A cannon is fired with muzzle velocity of 150 m/s at an angle of elevation = 45o,

gravity = 9.8 m/s2. What is the maximum height projectile reaches?

* Write a function called reverse\_diag that creates a square matrix whose elements are 0 except for 1s on the reverse diagonal from top right to bottom left. The reverse diagonal of an n-by-n matrix consists of the elements at the following indexes: (1, n), (2, n-1), (3, n-2), … (n, 1). The function takes one positive integer input argument named n, which is the size of the matrix, and returns the matrix itself as an output argument. Note that using the built-in functions eye and diag are not allowed. (Hint: you can index into a matrix with a single index and MATLAB will handle it as if it was a vector using column-major order.)
* Write a program to determine the value of n i.e. needed to exceed the values of expressions: n^2 +10n +10 just above 5000. (Use while loop).

19. Generate a GP series 2^n up to number entered by user and also evaluate number of terms that comes in this span.

**Programming Assignments Submission Template**

**Applied Mathematics**

**Programming Assignment no.** : **2**

**Name of student: Rupesh bharat more**

**Branch & Block: b5 IT**

**Cycle No. :**

**Roll No. :512**

**Problem Statement:** *(copy the given problem statement here)*

12. Write a code to find the square root of the mean of the squares of the first n positive odd integers, where n is a positive integer and is the only input. For example, if n is 3, your code needs to compute the square root of the average of the numbers 1, 9, and 25. You may use built-in functions including, for example, sum and sqrt, except for the built-in function rms, which is not allowed

**Algorithm (Logical understanding of the problem):**

**These the logical problem which is divided into several steps they are as follows:**

**Step1:in first step ,input should be taken from user**

**Step2: we should assign zero value to some variable like ‘sum’**

**Step3:in 3rd step we should apply for loop for given n i.e**

**From 1to n**

**Step4: in that for loop we should apply range from 1 to 2n-1**

**Step5: in these step we should find odd no while loop s iterating for given range**

**Step 6: we should add that in our sum whose value is zero in given loop**

**Step7:in these step we will get sum which contains values for given range**

**Step9: we should find their average or mean by dividing it by n**

**Step10:and finally find square root by using inbuilt method sqrt.**

**Code in MATLAB:** *(paste the final code)*

n = input('enter a no')

sum1 = 0;

for i=1:2n+1

if mod(i,2) ~= 0

sum1 = sum1 + (i.^2);

end

end

sum1 = sum1/n

sum1 = sum1.^0.5

**Output of program:** *(Snap shot of the output of your code in command window)*

*Now here when we take input from user as 3 we get odd numbers 1,3,5 having squares 1,9,25*

*Now by dividing it by 3 we get output as 11.66*

*When we take finally square root of 11.66 we get the required value which is 3.414*

**Reporting of errors and debugging:** *(Mention all the errors you got in Command window while developing the code and how you resolve it. You can give the snap shot of errors here.)*

* Error in first attempt

in first attemp when i tried to implement i get a loooping error my looping is not perfect

* Error in second attempt

during second time when i tried to implement it there are some conditions which i wrote that was not essential

* ……
* ……