B.Tech (VII)- IT Workshop/MATLAB

Unit 3 (Part 2)

Practise Question set

24. Create a 3×5 matrix of random real numbers. Delete the third row.

25. Given the matrix:

```
>> mat = randi([1 20], 3,5)
mat =
        6  17   7  13  17
       17   5   4  10  12
        6  19   6   8  11
```

Why wouldn't this work:

```
mat(2:3, 1:3) = ones(2)
```

26. Create a three-dimensional matrix with dimensions $2 \times 4 \times 3$ in which the first "layer" is all 0 s, the second is all 1 s and the third is all 5 s. Use **size** to verify the dimensions.

27. Create a vector x which consists of 20 equally spaced points in the range from $-\pi$ to $+\pi$. Create a y vector which is **sin(x)**.

28. Create a 3×5 matrix of random integers, each in the inclusive range from -5 to 5. Get the **sign** of every element.

29. Find the sum $3+5+7+9+11$.

30. Find the sum of the first n terms of the harmonic series where n is an integer variable greater than one.

$$1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\cdots$$

31. Find the following sum by first creating vectors for the numerators and denominators:

$$\frac{3}{1}+\frac{5}{2}+\frac{7}{3}+\frac{9}{4}$$

32. Create a matrix and find the product of each row and column using **prod**.

34. Write a relational expression for a vector variable that will verify whether the last value in a vector created by **cumsum** is the same as the result returned by **sum**.

35. Create a vector of five random integers, each in the inclusive range from -10 to 10. Perform each of the following:
    - subtract 3 from each element
    - count how many are positive
    - get the cumulative minimum
36. Create a 3×5 matrix. Perform each of the following:
    - Find the maximum value in each column.
    - Find the maximum value in each row.
    - Find the maximum value in the entire matrix.
    - Find the cumulative maxima.
37. Find two ways to create a 3×5 matrix of all 100s (Hint: use **ones** and **zeros**).
38. Given the two matrices:

$$A \qquad\qquad B$$
$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & -1 & 6 \end{bmatrix} \begin{bmatrix} 2 & 4 & 1 \\ 1 & 3 & 0 \end{bmatrix}$$

Perform the following operations:

```
A + B
A - B
A * B
```

39. The built-in function **clock** returns a vector that contains 6 elements: the first three are the current date (year, month, and day) and the last three represent the current time in hours, minutes, and seconds. The seconds is a real number, but all others are integers. Store the result from clock in a variable called *myc*. Then, store the first three elements from this variable in a variable *today* and the last three elements in a variable *now*. Use the fix function on the vector variable *now* to get just the integer part of the current time.

40. A vector *v* stores for several employees of the Green Fuel Cells Corporation, their hours worked one week followed for each by the hourly pay rate. For example, if the variable stores

```
>> v
v =
  33.000010.500040.000018.000020.00007.5000
```

that means the first employee worked 33 hours at $10.50 per hour, the second worked 40 hours at $18 an hour, and so on. Write code that will separate this into two vectors, one that stores the hours worked and another that stores the hourly rates. Then, use the array multiplication operator to create a vector, storing in the new vector, the total pay for every employee.

41. A company is calibrating some measuring instrumentation and has measured the radius and height of one cylinder 8 separate times; they are in vector variables r and h. Find the volume from each trial, which is given by $\pi r^2 h$. Also use logical indexing first to make sure that all measurements were valid (>0).

```
>> r = [5.499 5.498 5.5 5.5 5.52 5.51 5.5 5.48];
>> h = [11.1 11.12 11.09 11.11 11.11 11.1 11.08 11.11];
```

42. For the following matrices A, B, and C:

$$A = \begin{bmatrix} 1 & 4 \\ 3 & 2 \end{bmatrix} \quad B = \begin{bmatrix} 2 & 1 & 3 \\ 1 & 5 & 6 \\ 3 & 6 & 0 \end{bmatrix} \quad C = \begin{bmatrix} 3 & 2 & 5 \\ 4 & 1 & 2 \end{bmatrix}$$

Give the result of 3*A.
Give the result of A*C.
Are there any other matrix multiplications that can be performed? If so, list them.

43. For the following vectors and matrices A, B, and C:

$$A = \begin{bmatrix} 4 & 1 & -1 \\ 2 & 3 & 0 \end{bmatrix} \quad B = [1 \ \ 4] \quad C = \begin{bmatrix} 2 \\ 3 \end{bmatrix}$$

Perform the following operations, if possible. If not, just say it can't be done!

```
A * B
B * C
C * B
```

44. The matrix variable *rainmat* stores the total rainfall in inches for some districts for the years 2010–13. Each row has the rainfall amounts for a given district. For example, if *rainmat* has the value:

```
>> rainmat
ans =
25 33 29 42
53 44 40 56
etc.
```

district 1 had 25 in. in 2010, 33 in 2011, etc. Write expression(s) that will find the number of the districts that had the highest total rainfall for the entire four year period.

45. Generate a vector of 20 random integers, each in the range from 50 to 100. Create a variable *evens* that stores all of the even numbers from the vector, and a variable *odds* that stores the odd numbers.

46. Assume that the function **diff** does not exist. Write your own expression(s) to accomplish the same thing for a vector.

47. Create a vector variable *vec*; it can have any length. Then, write assignment statements that would store the first half of the vector in one variable and the second half in another. Make sure that your assignment statements are general, and work whether *vec* has an even or odd number of elements (Hint: use a rounding function such as **fix**).