Course > Unit 2: ... > MATLA... > 1. Diag...

1. Diagonal matrices in MATLAB
Diagonal matrices (External resource) (1.0 points possible)

- If A is an $n \times n$ square matrix, then

```
x = diag(A)
```

creates a column vector x out of the elements from the main diagonal of A.

Complete the script below, which illustrates the two uses of the diag command.

Your Script

💾 Save   ⟳ Reset   📑 MATLAB Documentation (https://www.mathworks.com/help/)

```
1  % Firstly create a random 15x15 matrix A using the rand() command
2  A = rand(15,15);
3  % Now create a new variable v which is a column vector
4  % made from the main diagonal of A using the diag() function
5  v = diag(A)
6  % Now create a 10x10 diagonal matrix D made from the first ten elements of v.
7  % Think carefully about the easiest way to do this. Remember you can create as man
8  D = diag(v(1:10));
```
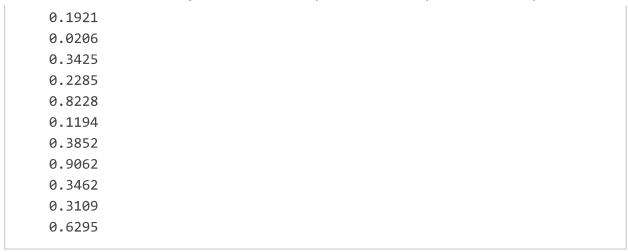
▶ Run Script   ❓ ()

Assessment: Correct

Submit   ❓ ()

✅ **A correctly defined**

✅ **v correctly defined**

✅ **D correctly defined**

Output

```
v =

    0.6717
    0.0022
    0.1013
    0.7272
```

```
0.1921
0.0206
0.3425
0.2285
0.8228
0.1194
0.3852
0.9062
0.3462
0.3109
0.6295
```

Upper triangular matrices (External resource)

(1.0 points possible)

Upper triangular matrices

Given any square matrix $\mathbf{A}$, MATLAB can create an upper triangular matrix $\mathbf{X}$ out of the upper triangular elements of $\mathbf{A}$ using the following command

```
X = triu(A)
```

In the MATLAB script below, we demonstrate that the determinant of an upper triangular matrix is equal to the product of the diagonal elements. Fill in the missing pieces in the script, and run the script a couple of times for yourself on your own browser to check the result holds!

Your Script

💾 Save   C Reset   📖 MATLAB Documentation (https://www.mathworks.com/help/)

```
1  % Firstly generate a random 10X10 matrix A using the rand() command
2  A = rand(10);
3  % Now define an upper triangular matrix X made out of the upper triangular element
4  X = triu(A);
5  % Calculate the determinant of X explicity using det(). Define the value of the de
6  d1 = det(X)
7  % Finally extract the main diagonal of X as a column vector v by using the diag()
8  % We then calculate the product of the elements of v and call this d2. You should
9  v = diag(X);
10 d2 = prod(v)
11 a = d1-d2;
12
```

▶ Run Script   ❷ ()

Assessment: Correct

Submit   ❷ ()

✅ **Determinant is product of diagonal entries**

✅ **A correctly defined**

✅ **X correctly defined**

✅ **v correctly defined**

✅ **d1 correctly defined**

Output

```
d1 =

    3.9483e-04


d2 =

    3.9483e-04
```

1. Diagonal matrices in MATLAB

Topic: Unit 2: Linear Algebra, Part 2 / 1. Diagonal matrices in MATLAB

Hide Discussion

Add a Post

Show all posts ▼	by recent activity ▼

There are no posts in this topic yet.

✖

Learn About Verified Certificates