

Octave/Matlab Tutorial

Quiz, 5 questions

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1.

Suppose I first execute the following in Octave/Matlab:

```
1 A = [1 2; 3 4; 5 6];
2 B = [1 2 3; 4 5 6];
```

Which of the following are then valid commands? Check all that apply. (Hint: A' denotes the transpose of A.)

☐ C = A' + B;

☐ C = B * A;

☐ C = A + B;

☐ C = B' * A;

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2.

Let $A = \begin{bmatrix} 16 & 2 & 3 & 13 \\ 5 & 11 & 10 & 8 \\ 9 & 7 & 6 & 12 \\ 4 & 14 & 15 & 1 \end{bmatrix}$.

Which of the following indexing expressions gives $B = \begin{bmatrix} 16 & 2 \\ 5 & 11 \\ 9 & 7 \\ 4 & 14 \end{bmatrix}$? Check all that apply.

☐ B = A(:, 1:2);

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☐ `B = A(:, 0:2);`

☐ `B = A(0:4, 0:2);`

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3.

Let A be a 10x10 matrix and x be a 10-element vector. Your friend wants to compute the product Ax and writes the following code:

```
1 v = zeros(10, 1);
2 for i = 1:10
3     for j = 1:10
4         v(i) = v(i) + A(i, j) * x(j);
5     end
6 end
```

How would you vectorize this code to run without any FOR loops? Check all that apply.

☐ `v = A * x;`

☐ `v = Ax;`

☐ `v = A .* x;`

☐ `v = sum (A * x);`

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4.

Say you have two column vectors v and w , each with 7 elements (i.e., they have dimensions 7x1). Consider the following code:

```
1 z = 0;
2 for i = 1:7
3     z = z + v(i) * w(i)
4 end
```

Which of the following vectorizations correctly compute z? Check all that apply.

☐ `z = sum (v .* w);`

☐

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☐ $z = w' * v;$
☐ $z = v * w';$
☐ $z = w * v';$

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5.

In Octave/Matlab, many functions work on single numbers, vectors, and matrices. For example, the sin function when applied to a matrix will return a new matrix with the sin of each element. But you have to be careful, as certain functions have different behavior. Suppose you have an 7x7 matrix X . You want to compute the log of every element, the square of every element, add 1 to every element, and divide every element by 4. You will store the results in four matrices, A, B, C, D . One way to do so is the following code:

```

1  for i = 1:7
2    for j = 1:7
3      A(i, j) = log(X(i, j));
4      B(i, j) = X(i, j) ^ 2;
5      C(i, j) = X(i, j) + 1;
6      D(i, j) = X(i, j) / 4;
7    end
8  end

```

Which of the following correctly compute A, B, C , or D ? Check all that apply.

☐ $C = X + 1;$
☐ $D = X / 4;$
☐ $A = \log(X);$
☐ $B = X ^ 2;$
☐

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