

1. Suppose I first execute the following Octave/Matlab commands:

1 point

```
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;

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

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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);

☒ B = A(1:4, 1:2);

☐ B = A(0:2, 0:4)

☐ B = A(1:2, 1:4);

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:

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```
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);

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

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```

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.

- ☒ $z = \text{sum}(v .* w);$
- ☒ $z = w' * v;$
- ☐ $z = v * w';$
- ☐ $z = w * v';$

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 7×7 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:

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```

8 end

```

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

- ☒ $C = X + 1;$
- ☒ $D = X / 4;$
- ☒ $B = X.^2;$
- ☐ $B = X ^ 2;$

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