

Feedback — V. Octave Tutorial

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You submitted this quiz on **Mon 26 Jan 2015 9:55 AM CET**. You got a score of **5.00** out of **5.00**.

Question 1

Suppose I first execute the following Octave commands:

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

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

Your Answer	Score	Explanation
<input checked="" type="checkbox"/> $C = B' + A;$	 0.25	B' is 3×2 and A is 3×2 , so their sum is well defined.
<input type="checkbox"/> $C = A' * B;$	 0.25	A' is 2×3 and B is 2×3 , so A' does not have the same number of columns as B has rows, and the product is not well defined.
<input type="checkbox"/> $C = B + A;$	 0.25	B is 2×3 and A is 3×2 , so their sum is not well defined.
<input checked="" type="checkbox"/> $C = A * B;$	 0.25	A is 3×2 and B is 2×3 , so A has the same number of columns as B has rows, and the product is well defined.
Total	1.00 / 1.00	

Question 2

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

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

Your Answer	Score	Explanation
<input type="checkbox"/> $B = A(:, 0:2);$	✓ 0.25	The first element in Octave has index 1, so selecting columns 0 through 2 is invalid.
<input checked="" type="checkbox"/> $B = A(:, 1:2);$	✓ 0.25	$A(:, 1:2)$ selects every row and the first two columns of A, giving the desired B.
<input checked="" type="checkbox"/> $B = A(1:4, 1:2);$	✓ 0.25	$A(1:4, 1:2)$ selects the first four rows and first two columns of A, giving the desired B.
<input type="checkbox"/> $B = A(0:4, 0:2);$	✓ 0.25	The first element in Octave has index 1, so this expression is invalid.
Total	1.00 / 1.00	

Question 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:

```
v = zeros(10, 1);
for i = 1:10
    for j = 1:10
        v(i) = v(i) + A(i, j) * x(j);
    end
end
```

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

Your Answer	Score	Explanation
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<input checked="" type="checkbox"/>	✓	0.25	Octave will correctly perform the matrix-vector product equivalent to the for loop above.
<input type="checkbox"/>	✓	0.25	The summation involved in the matrix-vector product occurs on its own without needing to call the sum function explicitly.
<input type="checkbox"/>	✓	0.25	The .* operator performs element-wise multiplication, which is invalid for two matrices of different sizes.
<input type="checkbox"/>	✓	0.25	Octave does not implicitly multiply without * but instead will look for a variable called "Ax".
Total		1.00 /	
		1.00	

Question 4

Say you have two column vectors v and w , each with 7 elements (i.e., they have dimensions 7×1).

Consider the following code:

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

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

Your Answer	Score	Explanation
<input checked="" type="checkbox"/> $z = v' * w;$	✓ 0.25	By taking the transpose of v , the product computes the sum of the element-wise product of v and w , just as the for-loop code does.
<input type="checkbox"/> $z = v * w;$	✓ 0.25	v has dimension 7×1 and w has dimension 7×1 , so their product is undefined.
<input checked="" type="checkbox"/> $z = \text{sum}(v .* w);$	✓ 0.25	This code explicitly computes the sum of the element-wise product of v and w , just as the for-loop code does.
<input type="checkbox"/>	✓ 0.25	Recall that .* computes the element-wise product, not the matrix

$z = v .*$

product, so the result here is also a 7x1 vector.

$w;$

Total 1.00 /
1.00

Question 5

In Octave, 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:

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

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

Your Answer	Score	Explanation
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<input checked="" type="checkbox"/> $B = X.^2;$	✓ 0.25	The <code>.^</code> operator performs element-wise exponentiation.
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<input checked="" type="checkbox"/> $C = X + 1;$	✓ 0.25	Adding a single number applies element-wise to a matrix.
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<input checked="" type="checkbox"/> $D = X / 4;$	✓ 0.25	Division by a single number applies element-wise to a matrix.
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<input type="checkbox"/> $B = X ^ 2;$	✓ 0.25	The code $X ^ 2$ is equivalent to $X * X$ which is only defined if X is a square matrix. To compute the square of each element, you need to write $X.^2$.
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Total	1.00 /
	1.00