

Common Confusion 4

'length' vs. 'size'

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These two functions are quite similar. However, it is important to use them properly to avoid any unexpected results.

The 'length' function returns the length of the largest dimension of a given input. When using the 'length' function on a vector, this will simply return the amount of elements in the vector since a vector by definition has a row or column size of '1'. In this instance, you could also use the 'numel' function, which returns the number of elements in a given input. For matrices, the 'length' function will return the largest of the dimensions. In terms of other functions, for a matrix 'X', this looks like:

```
'max(size(X))'
```

The 'length' function is *intended* to be used on vectors, but can be used on a scalar or matrix without getting an error. For scalars, you do not need to use the 'length' function because you already know the length of it is '1'. For matrices, you should use the 'size' function, *unless* you need to return just the largest of the matrices dimensions.

As a small note, you should use the 'strlength' function to find the number of characters in a string or character vector. We are unlikely to use this in class, but it is helpful to know it exists if needed.

The 'size' function returns a row vector containing the lengths of the dimensions of a given input. If you need both the row and column dimension of a matrix, then you should use the 'size' function. If you need just the row or column dimension of a matrix, but you do not know which is larger, then you should still use the 'size' function. To store just one of these dimensions of the matrix, you can use the '~' operator. If you use this operator in conjunction with the 'size' function, you can store just the dimension(s) you need. This can be seen here:

```
'[rowSize, ~] = size(X)'
```

The line above will take the 'size' of 'X' and store the row size in 'rowSize' and discard the column size. If you had replaced the '~' operator with 'columnSize', then the column size of 'X' would have been stored in the variable 'columnSize'. You can extend all of this to apply to a matrix larger than two dimensions.

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For reference, the 'isempty', 'isscalar', and 'ismatrix' functions can be useful when deciding whether to use the 'length' or 'size' function.

In most instances, use the 'length' function for vectors and use the 'size' function for matrices. If you do this, then you decrease your risk of getting an unexpected result substantially.