Phys 361: Introduction to Array Assignment

Problem 1: Basic calculation with an array.

For the function $y = x^2 - e^{0.5x} + x$, calculate the value of y for the following values of x using an row array for x with the following elements: -3, -2, -1, 0, 1, 2, 3.

```
%Write code here
```

Problem 2: Defining functions.

Exploring Built-in Functions for Arrays and Matrices

Many, dare I say most, built-in functions have no problem working with arrays and matrices. Depending on the function, it might act element-by-element or on the whole array. Below are a few examples. Run the code and replace the "What does.." line with some a short description of what the function does. Try to figure it out without looking at the help.

Declaring and shaping arrays:

What does linspace do?

```
array1 = linspace(1,20,200)
```

What does length do?

```
length(array1)
```

What does rand do?

```
randmat=rand(4,6)
```

What does size do?

```
size(randmat)
```

What does reshape do?

```
reshape(randmat, 8,3)
```

What does diag do?

```
diagval=[10:-2:4]
newdiagmat=diag(diagval)
```

What does zero do?

```
zeros(3,2)
```

What does ones do?

```
ones(3,2)
```

What does eye do?

```
eye(3)
```

Basic Statistics:

How does mean work?

```
newrando=rand(2,3)    %Generate a test matrix
mean(newrando)        %Defualts to taking the mean of row
mean(newrando,1)      %Mean of rows
mean(newrando,2)      %Mean of columns
mean(mean(newrando))  %Doing it twice will give you the mean of all values
```

How does max work? (Note: min is a function that works in a similar way.)

```
randarray=rand(1,6)'
ans=max(randarray)
[d,n]=max(randarray)    %Optional output format
```

What does sum do?

```
sum(newrando)
sum(randarray)
```

What does sort do?

```
sort(randarray)
```

What does median do?

```
median(randarray)
```

What does std do?

```
std(randarray)
```

Advanced: What does det do?

```
squaremat=rand(3,3)
det(squaremat)
```

Advanced: What do dot and cross do?

```
a=[1 2 3];
b=[3 4 5];
dot(a,b)
cross(a,b)
```

Advanced: What does inv do?

```
inv(squaremat)
inv(squaremat)*squaremat
```

Note: There are many more useful functions than than what is included here. A pdf of useful functions can be found on the Canvas webpage.

Optional Advanced Exercises:

Exercise 1: Explore table arrays

Use the Help window or `doc table` to learn how to use the table command. Look up information on at least 4 elementary particles (name, charge, mass, spin, etc.)

Follow the example in the documentation and make a table containing the information you gathered.

Exercise 2: Explore the cell data type

The cell data type allows you to collect lists of any type of data. For example, you can create a cell of data that contains both numbers and strings. Look up the documentation on `cell` and `cell2table` (or watch the short video on Canvas). Define a cell data type for elementary particles, storing the name, mass, charge, and spin for each partile. Next write some code to display the information in a table.

Exercise 3: Explore the structure data type

The `stucture` data type is another useful way to store data. Look up the documentation on `structures` and `cell2struct`. Define a `structure` data type for elementary particles, storing the name, mass, charge, and spin for each partile. Demonstrate your structure works as intended with some output.