lecture_05

January 31, 2017

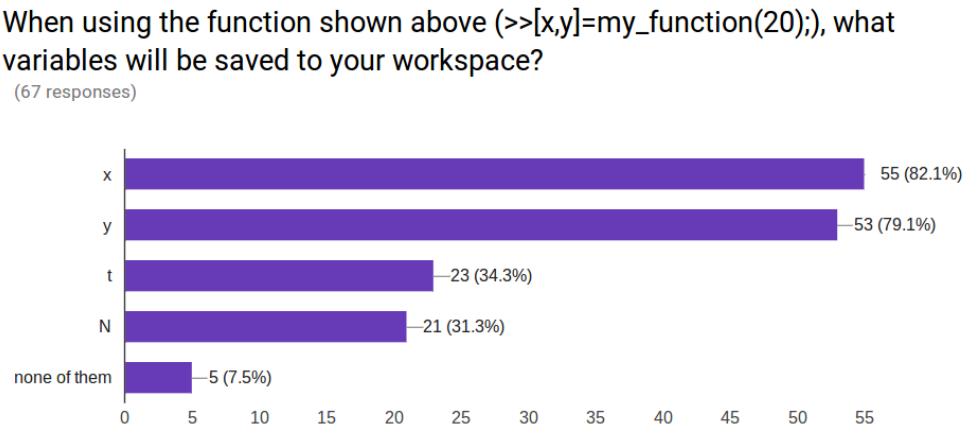
```
In [1]: %plot --format svg
```

0.1 Questions from last class

When you execute the given function
my_function.m:

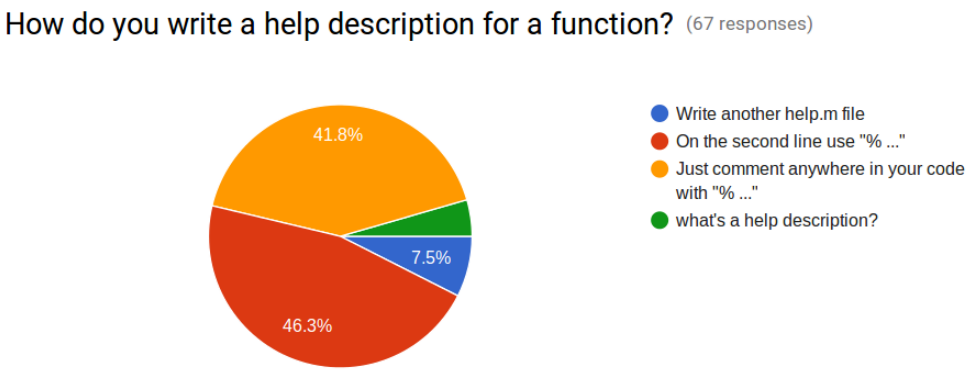
```
function [x,y] = my_function(max_time)
    N=100;
    t=linspace(0,max_time,N);
    x=t.^2;
    y=2*t;
end
```

as
`>> [x,y] = my_function(20);`
What variables are saved to your workspace?



responses

How do you write a help description for a function?
How to keep our forked ME3255S page up to date with the original pretty tired this morning
How do I use the Github Desktop?
whats your favorite football team?



responses to question 2

Will UConn's github get updated to the newest version of github? As u said in class trail and error is the best way of learning.

I believe the % is the same as matlab where it de-links your code into text

Does the @ symbol designate a pointer?

Given the change of air pressure as altitude increases, how fast would a frisbee have to travel (and spin) to hit an airplane?

What is a gui?

could you go over a nested for loop example

Can't seem to get this function to produce any graph and am not sure why

When are these google forms due?

how do I create a new function using Github on my desktop?

Can you explain the first question more in class?

What is the meaning of life?

Should I just know how or what these topics are or will we learn them in the future?

```
In [2]: f =@(x) x.^2

f =

    @(x)x.^2


In [3]: f([1:2:10])
        f(4)

ans =

     1     9    25    49    81


ans =

    16
```

```
In [4]: % nested for loop example
        for i = [1:6]
            for j = [1:3]
                fprintf('i=%i and j=%i\n',i,j)
            end
        end
```

```
i=1 and j=1
i=1 and j=2
i=1 and j=3
i=2 and j=1
i=2 and j=2
i=2 and j=3
i=3 and j=1
i=3 and j=2
i=3 and j=3
i=4 and j=1
i=4 and j=2
i=4 and j=3
i=5 and j=1
i=5 and j=2
i=5 and j=3
i=6 and j=1
i=6 and j=2
i=6 and j=3
```

1 From last class

```
In [5]: help my_function
```

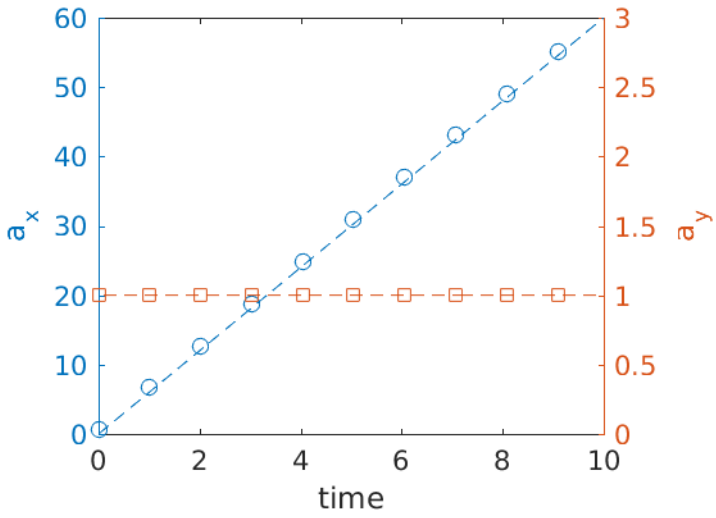
```
Help documentation of "my_function"
  This function computes the velocity in the x- and y-directions given
  three vectors of position in x- and y-directions as a function of time
  x = x-position
  y = y-position
  t = time
  output
  vx = velocity in x-direction
  vy = velocity in y-direction
```

```
In [6]: help my_caller
```

```
Help documentation of "my_caller"
  This function computes the acceleration in the x- and y-directions given
  three vectors of position in x- and y-directions as a function of time
  x = x-position
```

```
  y = y-position
  t = time
  output
  ax = acceleration in x-direction
  ay = acceleration in y-direction
```

```
In [7]: t=linspace(0,10,100)';
        x=t.^3; % vx = 3*t^2
        y=t.^2/2;  % vy = t
        [vx,vy]=my_function(x,y,t);
        [ax,ay]=my_caller(x,y,t);
        yyaxis left
        plot(t(1:10:end),ax(1:10:end),'o',t,6*t)
        ylabel('a_{x}')
        yyaxis right
        plot(t(1:10:end),ay(1:10:end),'s',t, 1*t./t)
        ylabel('a_{y}')
        xlabel('time')
        axis([0,10,0,3])
```




```
In [8]: diff_match_dims(x,t)
```

```
Undefined function 'diff_match_dims' for input arguments of type 'double'.
```

2 Good coding habits

2.1 naming folders and files

Stanford file naming best practices

1. Include information to distinguish file name e.g. project name, objective of function, name/initials, type of data, conditions, version of file,
2. if using dates, use YYYYMMDD, so the computer organizes by year, then month, then day
3. avoid special characters e.g. !, #, $, ...
4. avoid using spaces if not necessary, some programs consider a space as a break in code use dashes - or underscores _ or CamelCase

2.2 Commenting your code

Its important to comment your code to mention what a variable's units are, what the function is supposed to do, etc.

```
In [9]: function i=code(j)
            % Example of bad variable names and bad function name
            for w=1:j
                i(w)=w;
            end
        end
```

```
Error: Function definitions are not permitted in this context.
```

```
In [10]: help code
```

```
code not found.

Use the Help browser search field to search the documentation, or
type "help help" for help command options, such as help for methods.
```

2.3 Choose variable names that describe the variable

```
In [1]: function count_vector=counting_function(max_value)
            % Good variable names and better help documentation
            %
            % counting function creates a vector from 1 to max_value where each index, i, is
            % stored in each vector spot
            for i=1:max_value
                count_vector(i)=i; % set each element in count_vector to i
            end
        end
```

```
In [2]: help counting_function
```

```
'counting_function' is a command-line function

 Good variable names and better help documentation

 counting function creates a vector from 1 to max_value where each index, i, is
 stored in each vector spot
```

```
Additional help for built-in functions and operators is
available in the online version of the manual.  Use the command
'doc <topic>' to search the manual index.

Help and information about Octave is also available on the WWW
at http://www.octave.org and via the help@octave.org
mailing list.
```

2.4 Putting it all together

1. Clone your homework_1 to your computer
2. open Matlab (cli, jupyter or gui)
3. Change working directory to homework_1 *e.g.* Windows:`cd('C:\Users\rcc02007\Documents\Github\homework_1')`, Mac: `cd('/Users/rcc02007/Documents/Github/homework_1')`
4. You have already created your first script `setdefaults.m` (if not see lecture_4)
5. Run `>> setdefaults.m`
6. Create a new m-file called nitrogen_pressure.m
7. Create a function based upon the ideal gas law for nitrogen, Pv=RT
    1. R=0.2968 kJ/(kg-K)
    2. inputs to function are v (specific volume m^3/kg), and T, temperature (K)
    3. output is P, pressure (kPa)
8. Once the function works, commit the change to the repository (add a message, like 'added file nitrogen_pressure.m'
9. After file is 'committed', 'push' the changes to your github account

for the command-line git user, this is steps 8 and 9: 1. `$ git add *` 2. `$ git commit -m 'added file nitrogen_pressure.m'` 3. `$ git push -u origin master` `Username for 'https://github.uconn.edu':rcc02007 <enter>` `Password for 'https://rcc02007@github.uconn.edu':`

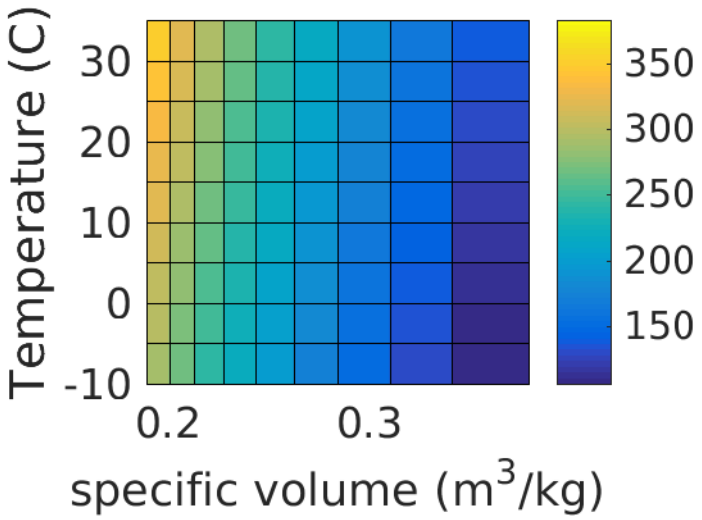
Now, use this function to plot the range of pressures that a pressure vessel would experience if it is 1000 gallons (3.79 m^3) with 10-20 kg of Nitrogen and temperatures range from -10 to 35 degrees C.

```
v=0.379/linspace(50,20,10);
T=273.15+linspace(-10,35,10);
[v_grid,T_grid]=meshgrid(v,T);
P = nitrogen_pressure(v,T);
pcolor(v_grid,T_grid,P)
```

```
In [13]: setdefaults;
         v=3.79./linspace(10,20,10);
         T=273.15+linspace(-10,35,10);
         [v_grid,T_grid]=meshgrid(v,T);
```

```
P = nitrogen_pressure(v_grid,T_grid);
pcolor(v_grid,T_grid-273.15,P-100)
xlabel('specific volume (m^3/kg)')
ylabel('Temperature (C)')
%zlabel('Pressure (kPa)')

%colormap winter
%colormap summer
%colormap jet
colorbar()
```



In [ ]: