## Intro Learning Module - Tips

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Problem Specification

1. Find Reactions $R_{A}, R_{B}$
2. Calculate ${ }_{x}$ for $r_{i}=1 \mathrm{~cm}$
3. Plot ${ }_{x}$ vs. $r_{i}$
4. ${ }_{x}$ vs. $r_{i}$ (Take 2)
5. ${ }_{x}$ vs. $r_{i}$ (Take 3: File Input/Output)
6. ${ }_{x}$ vs. $r_{i}$ (Take 4: Functions)

Tips
Comments

## Tips for MAE 2120 Project 1

## Combining Multiple Plots into One Figure

To present results compactly and succinctly, you can combine plots into one figure. For example, shearing force, bending moments and torque plots for a shaft can be presented in the same figure using the subplot function.


[^0]```
figure(1);
clf;
suptitle('Main Shaft Loads');
subplot(3,1,1)
plot(x, sforce, '-k');
xlabel('x (m)'); ylabel('Shear (kN)');
subplot(3,1,2)
plot(x, bm, '-r');
xlabel('x (m)'); ylabel('Moment (kN*m)');
subplot(3,1,3)
plot(x, torque, '-b');
xlabel('x (m)'); ylabel('Torque (kN*m)');
```

Here is the script to generate this figure. (Right-click and select save target as, or just left-click and copy-paste into the editor)
For more information on subplots, you can refer yourself to the MATLAB documentation.

## Marking Max and Min Locations in Plots

Use the max function to find the maximum value. For example, to find the maximum value of Bending Moment, use:

```
[bm_max, bm_max_index] = max(bm);
```

Then, the plot function can be used to mark an "x" in the graph to identify the location of this maximum value.

```
plot(x(bm_max_index), bm(bm_max_index),'xk');
```

Here is an example script that performs this task. Similarly, you can use the min function to find and mark the minimum value.

## Recording Max and Min Values in Plots

The text function can be used to record the maximum or minimum value.
Example:

```
maxval = num2str(bm(bm_max_index), 4);
text(x(bm_max_index)+0.025 , bm(bm_max_index), maxval );
```

Here is our example script which also records the max value of Bending Moment.

## More tips...

- You can have multiples outputs from a function.

Example:

```
qunction [sigma_x, I] = bending_stress(M, ro, ri)
                    I = pi*(ro^4}-\textrm{ri.^4)/4;
                    sigma_x = 1e-6*M*ro./I;
    end
```

- Use cosd(theta) if theta is in degrees.
- Pre-Allocation: Initialize arrays using zeros function. This will results in much faster code.
- Make sure your code is compatible with MATLAB 8.1 (included in release 2013a)


## Go to Comments

Go to all MATLAB Learning Modules


[^0]:    These subplots were generated using the following syntax.

