

# Intro Learning Module - Tips

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[Problem Specification](#)

1. Find Reactions  $R_A$ ,  $R_B$

2. Calculate  $x$  for  $r_i = 1$  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)

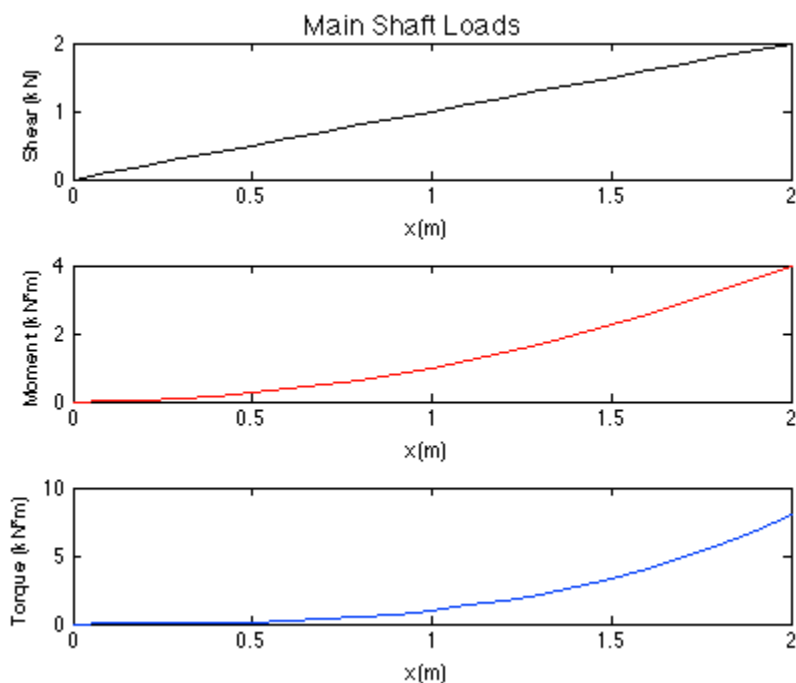
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## Tips for MAE 2120 Project 1

### 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.



These subplots were generated using the following syntax.

```
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:

```
function [sigma_x, I] = bending_stress(M, ro, ri)
    I = pi*(ro^4 - 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)

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