

COEN 45
Winter Quarter, 2011
Homework #5
Due Tues Feb 15

Write a single main script to do the four problems by calling the functions. Submit answers and function files.

1. Chapter 7, problem 21. Instead of adding just two vectors, your function should add any number of vectors with inputs `r` and `th` being vectors (in the MATLAB sense). Your function should start like

```
function [r th] = AddVecPol(r,th)
%function [r th] = AddVecPol(r,th)
%
% Function to add two or more vectors given in polar coordinates
%
% Inputs
%     r -- vector of r coordinates
%     th -- vector of theta coordinates (degrees)
%
% Output
%
%     r -- r coordinate of sum
%     th -- theta coordinate of sum (degrees)
%
error(nargchk(2,2,nargin))
```

Answers: (a) (16.8, 35.0°); (b) (19.7, -67.4°)

2. Chapter 7, problem 23. Hint: to check that a number is an integer, do *not* use `isinteger`. Instead, compare the number with its rounded-down version.
3. Chapter 7, problem 34. The formula for the centroid is

$$y_c = \frac{1}{A} \int y \, dA$$

which can be done in two parts, with $dA = d \, dy$ in the web and $dA = w \, dy$ in the flange. When you exercise the function with the dimensions given, you should get $y_c = 258.3$.

4. Chapter 7, problem 35. The sketch has t marked wrong – it's supposed to be the flange width. And in case the text isn't clear, what you do is
- Find the moment of inertia of the web and flange separately, about their centerlines.
 - Use the parallel axis formula to shift each moment of inertia to the centroid.
 - Add the two parts

The function should start like this:

```
function I = IxcTBeam(w,h,t,d)
%function I = IxcTBeam(w,h,t,d)
%
% Compute the moment of inertia of a T cross section around its centroid
%
% Inputs
%
%     w -- flange width
%     h -- total depth
%     t -- flange thicknes
%     d -- web thickness
%
% Output
%     I -- moment of inertia about centroid
%
error(nargchk(4,4,nargin))
yc = centroidT(w,h,t,d);
.....
```

Leave `centroidT` function in a separate m-file, not as a subfunction as stated. The answer comes out $3.7 \times 10^8 \text{ mm}^4$. How much is this in m^4 ? Do you see why I cling to inches?