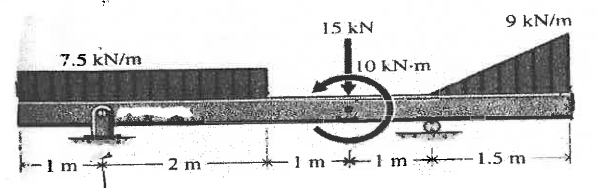
**Beam Shear and Moment Diagrams**

Thanks for downloading; I hope this program can be of some help to you. I know it will be if you’re in statics or mechanics of solids.

Added in release 2: Section retries by entering **e** in a request box.

Added in release 3: Max shear and moment evaluations, cleaned up variables after running.

In this document I will go over the input system and the main features. I will use an example problem from my last statics exam.



8

7

6

4

1

3

2

5

|8,|1,-7.5,-7.5,|0,24.25,0,|2,-7.5,-7.5,|1,0,0,|0,-15,-10,|1,0,0,|0,20,0,|1.5,0,-9

You must solve for the supports; this program will not do it for you. It will however, check that they are correct by testing values at the end of the beam in the **conf** matrix.

Solving yields Ay=24.25kN and By=20kN

Start by entering beam() in the document called BeamDiagram

It will ask you how many sections the beam consists of. Looking at the problem shown you can see 8 labeled sections underneath.

The three things that affect shear and moment in the beam are distributed loads, in units of force/length, concentrated loads, in units of force, and moments, in units of force\*length.

Along the entire beam there is a distributed load. Even if there isn't one drawn, there is a distributed load with a value of 0, like in sections 4 and 6. These act along a distance, not at a single point.

Concentrated loads and moments act at a single point.

So when you're looking at a beam, pretend like you're traveling along it from left to right, you need to create a new section when these things happen:

1.) Any time a D-load ends or begins

2.) Any place a C-load or moment is located

Taking a look at the problem again, Section 1 is a D-load, but it is interrupted by a C-load (the support). So you need another section (2) for the C-load, then another section to finish of the D-load (3). Then where the D-load changes from -7.5 kN/m to 0 you need another section (4), then (5) for the C-load and moment, (6) for another 0 D-load, (7) for the last support, (8) for the last D-load.

To enter the values for each section, concentrated loads have 0 length, so when it asks length enter 0, it will ask a force and moment, If force is upward, enter positive, if moment is clockwise, enter positive. For D-loads it will ask a length, type the length from the start until the next section, which may be a C-load or a change in D-load. Downward acting loads are negative, which most are, and it asks for left and right to accommodate triangular loading, if it's rectangular if would obviously be the same on both sides.

All of the inputs are broken up into sections beneath the diagram.

Entering the value **e** (the natural base) into a request box will delete the section you’re on and start back at asking section length. If you enter **e** into section length it will wipe the previous section and allow you to correct that section. **e**^1 also works and is faster to type.

The input system is much easier to understand after running the program.

The max shear and moment evaluations are given based on absolute value and are displayed at the end of the program.

The program outputs a few useful variables. To access these, either type in the name of the variable, or hit the var button.

**Funx** is the main output matrix of the program. It lists (in order):

[shear(x)][moment(x)][domain][shear(low)][shear(high)][moment(low)][moment(high)]

**Conf** is the “confirmation” matrix. It holds the final shear and moment values, which should be 0. It will inform you when either of these do not equal zero, it may be off by an insignificant amount and will cause a flag. However, if they are off by a large amount, you should double check your support calculations. Check conf if you run into issues.

**Shear** is the shear piecewise function and is graphed in blue. f1

**Moment** is the moment piecewise function and is graphed in red. f2

You will most likely need to adjust your window to see the graph correctly.

If you have any improvements to the code or any questions/comments email me at 12apennachi@gmail.com