

**Semester -1 Physics Project**

**Done by :**

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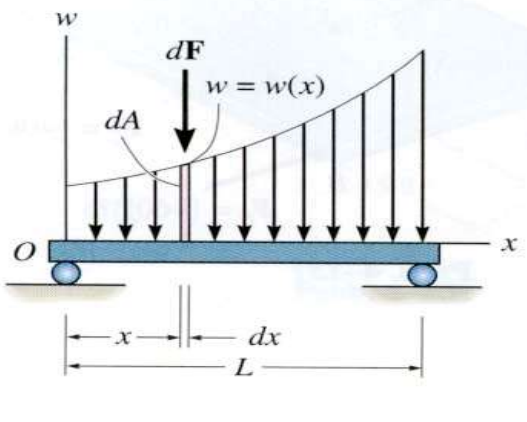
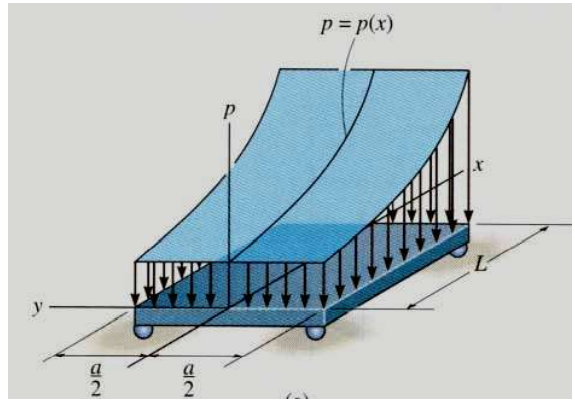
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**Concept**:

DISTRIBUTED LOADING

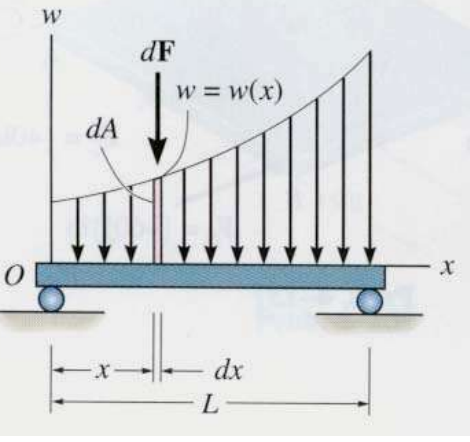
In many situations a surface area of a body is subjected to a distributed load. Such forces are caused by winds, fluids, or the weight of items on the body’s surface. We will analyse the most common case of a distributed pressure loading. This is a uniform load along one axis of a flat rectangular body. In such cases, w is a function of x and has units of force per length.

MAGNITUDE OF RESULTANT FORCE

Consider an element of length dx. The force magnitude dF acting on it is given as

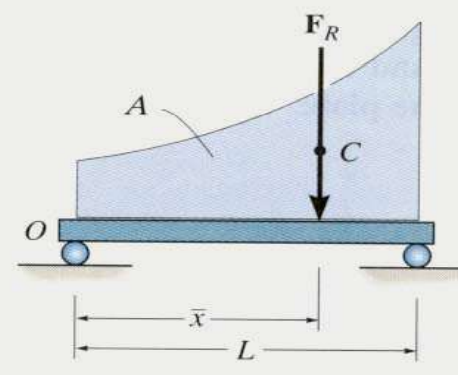
dF = w(x) dx



The net force on the beam is given by

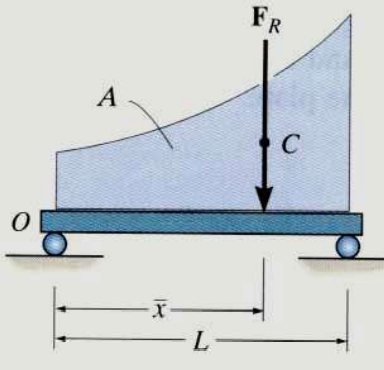
+ ¯ FR = òL dF = òL w(x) dx = A

Here A is the area under the loading curve w(x).

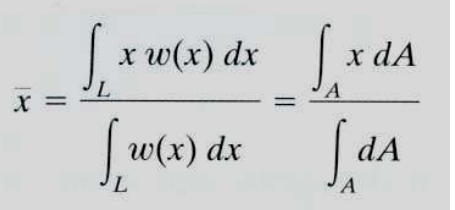


LOCATION OF THE RESULTANT FORCE

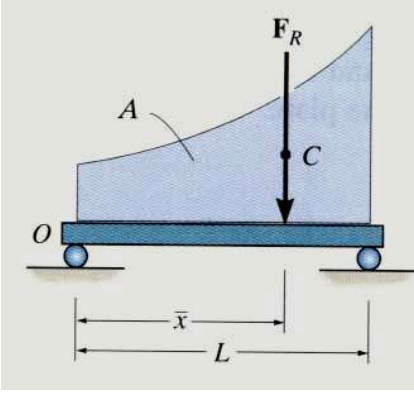
The force dF will produce a moment of (x)(dF) about point O. The total moment about point O is given as + MRO = òL x dF = òL x w(x) dx Assuming that FR acts at 𝑥 , it will produce the moment about point O as + MRO = (𝑥 ) (FR ) = 𝑥 òL w(x) dx

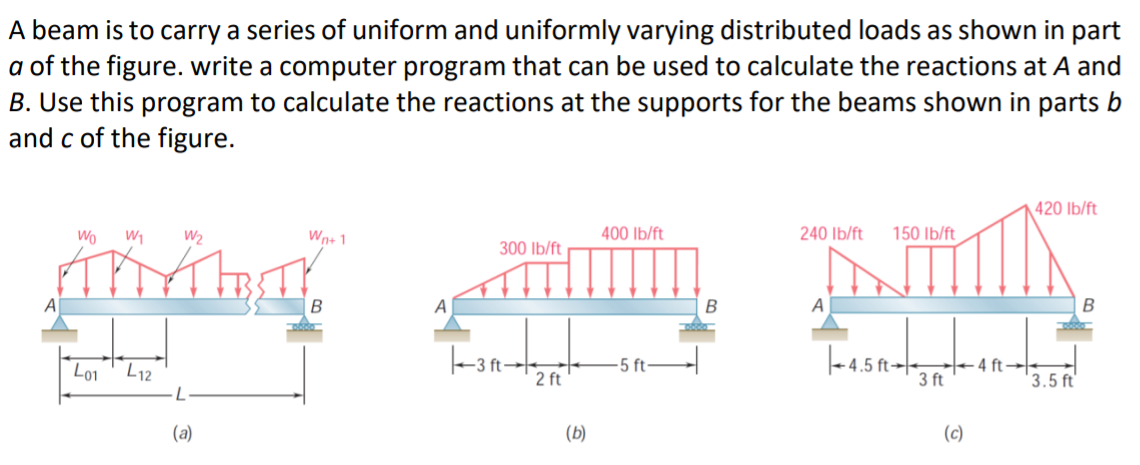
Comparing the last two equations,



we get to learn later that FR acts through a point “C,” which is called the geometric centre or centroid of the area under the loading curve w(x).

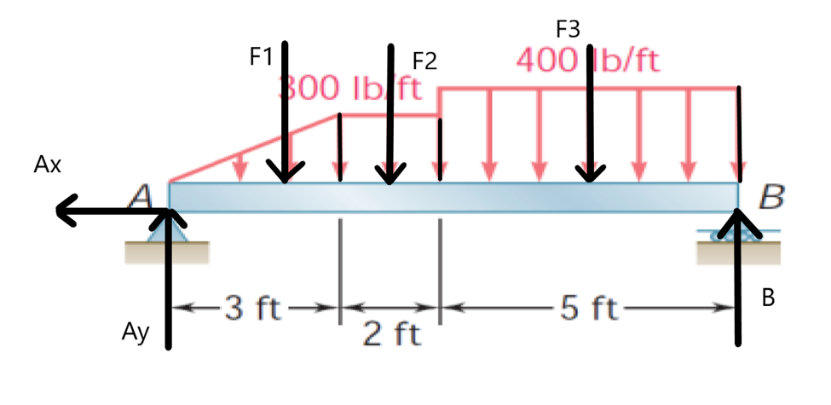
**Given question**:



**Solution**:

**Solving without program:**

**Solution for (b):**

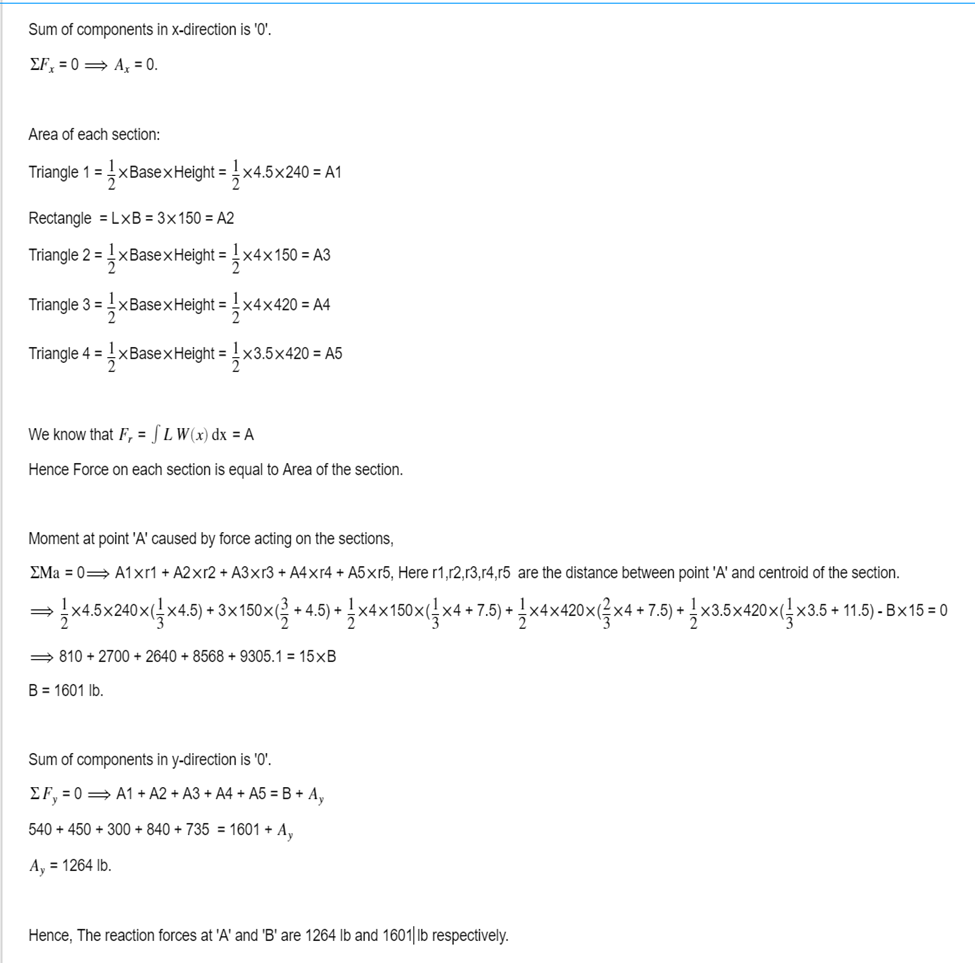


Free body diagram

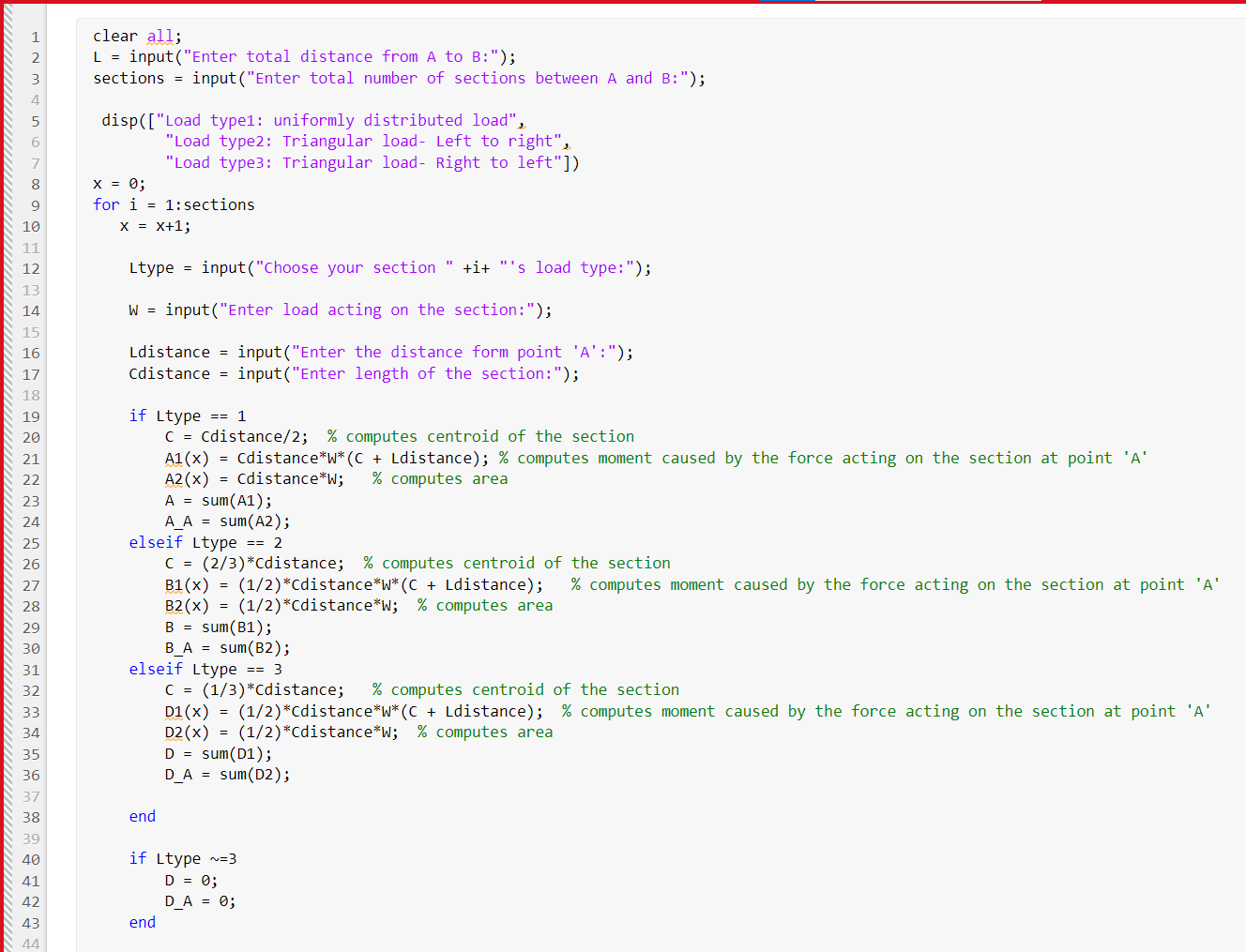


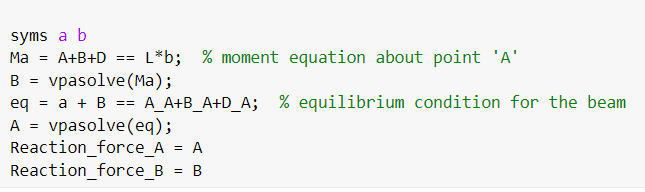
**Solution for (c):**





**MATLAB code:**

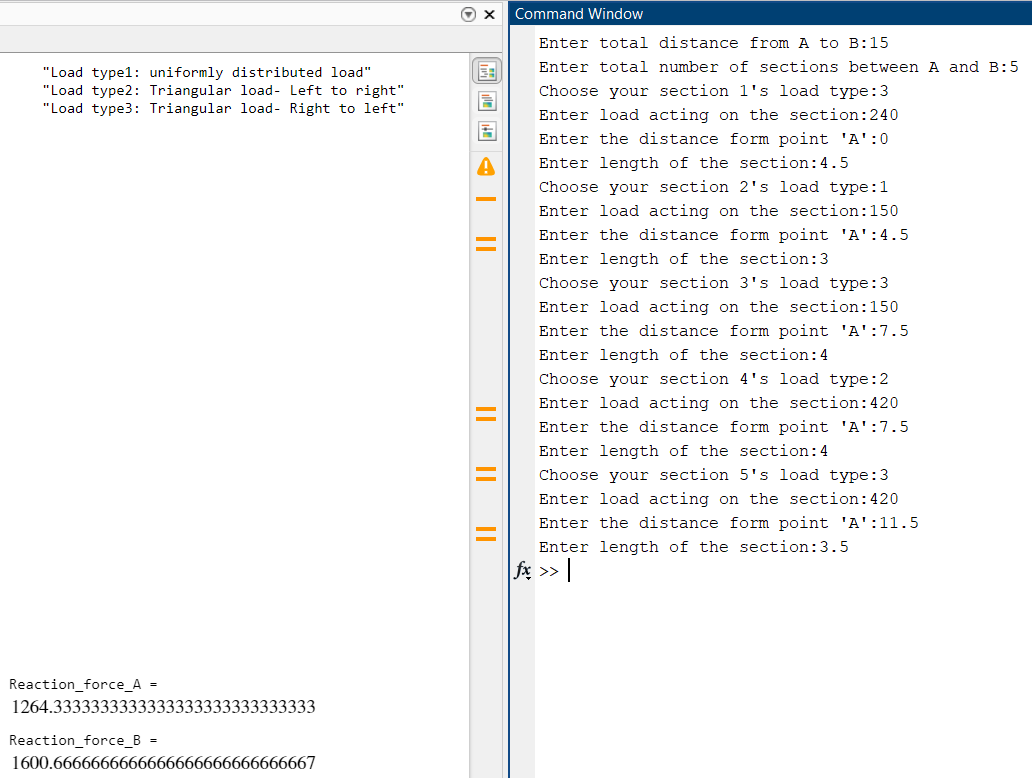




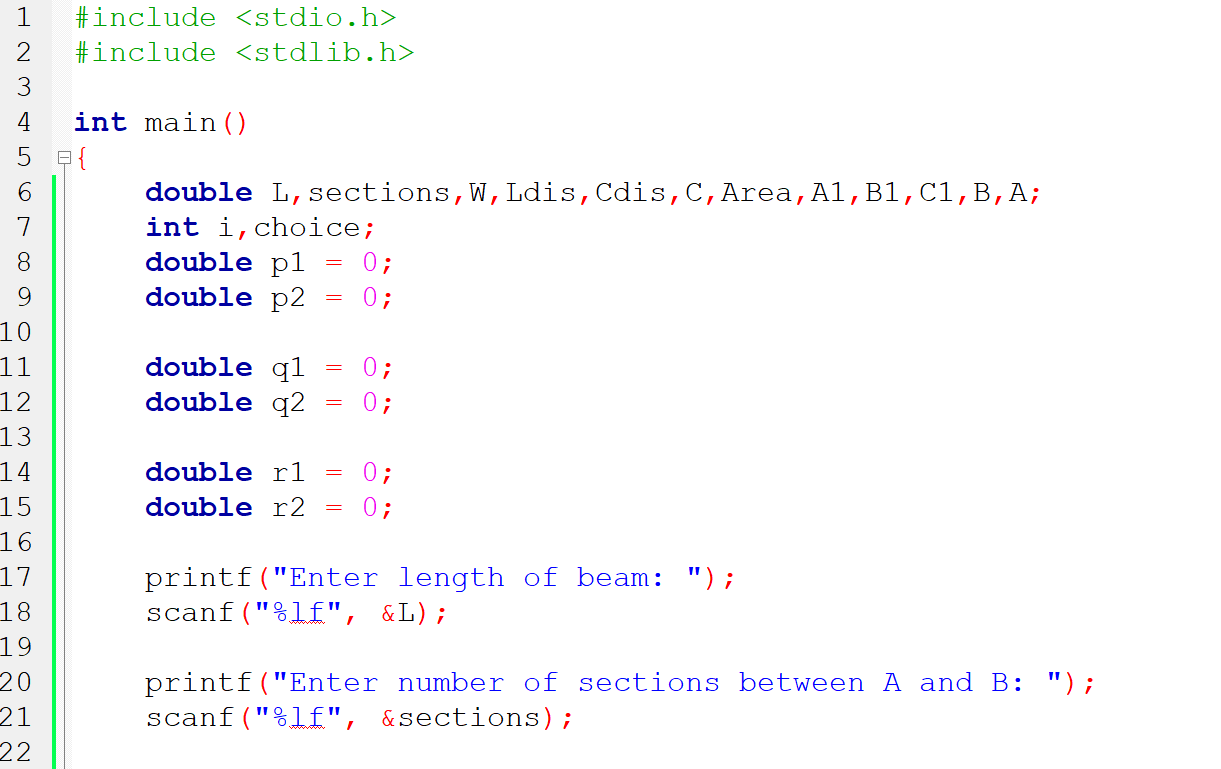
**Solution for (b) using the above code:**

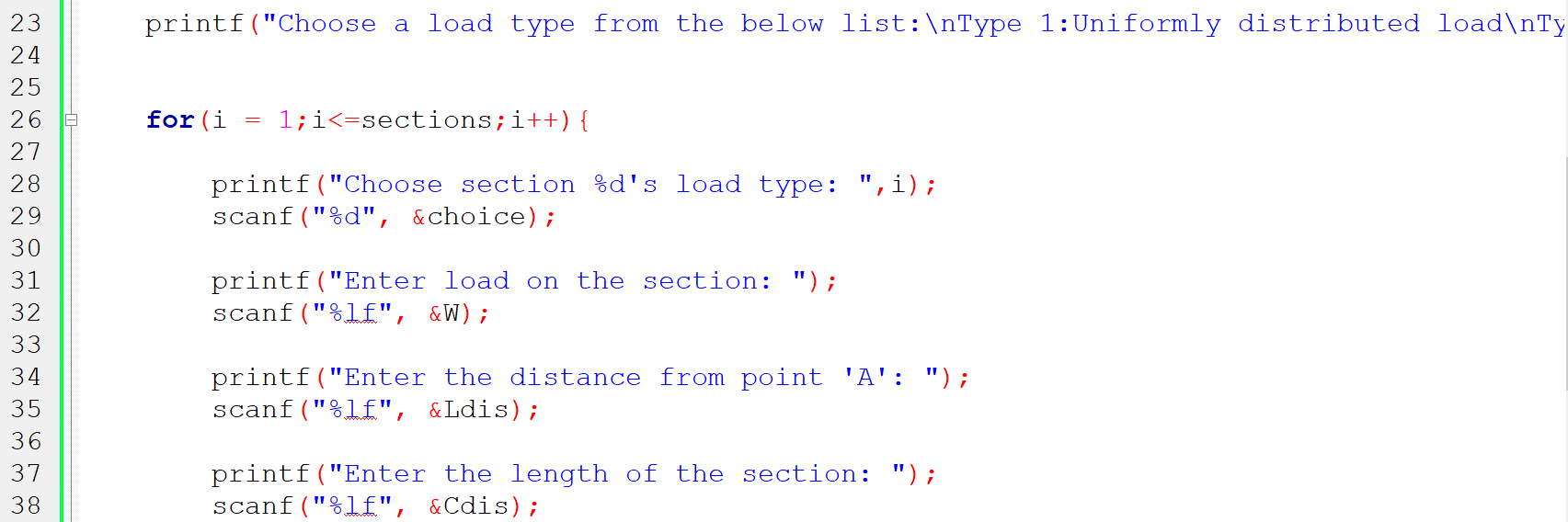


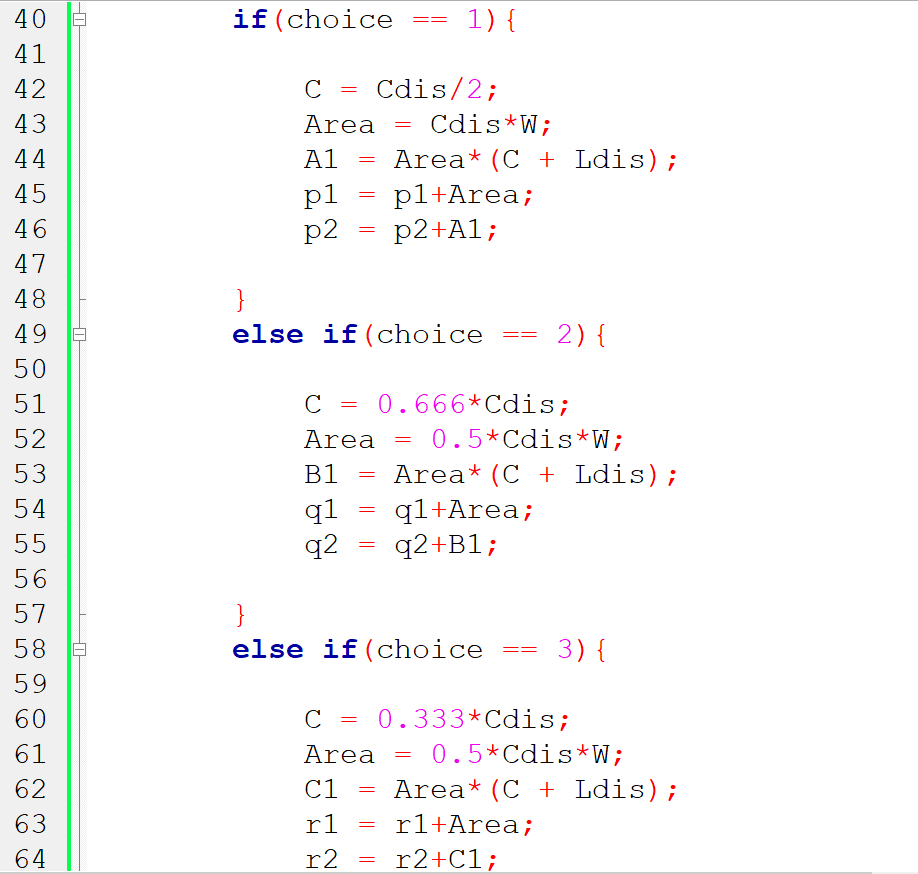
**Solution for (c) using the above code:**

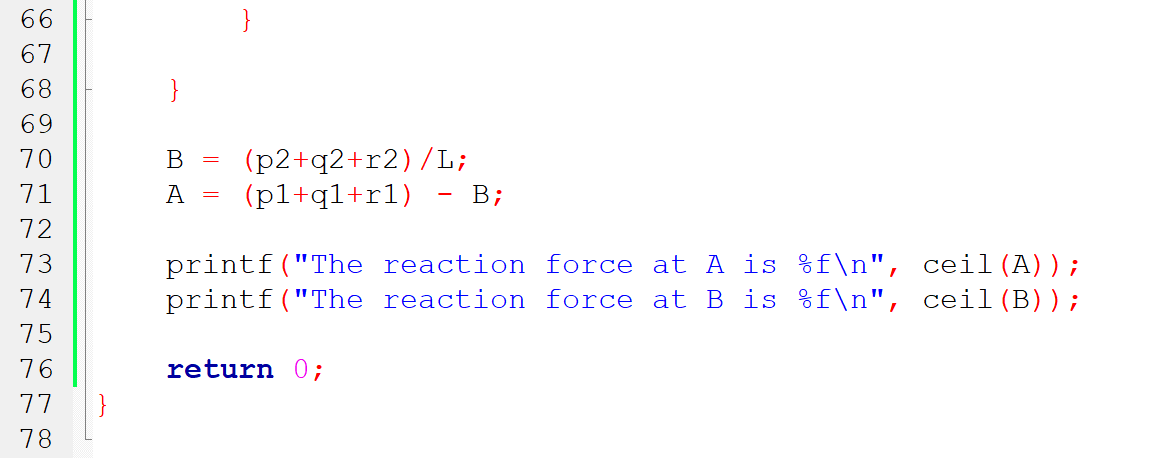


**Code in C language**:





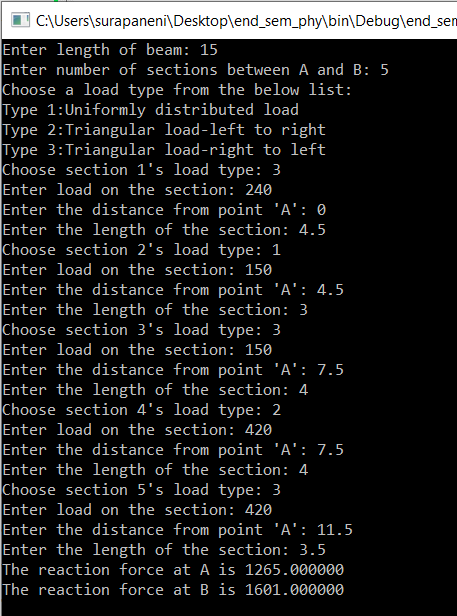




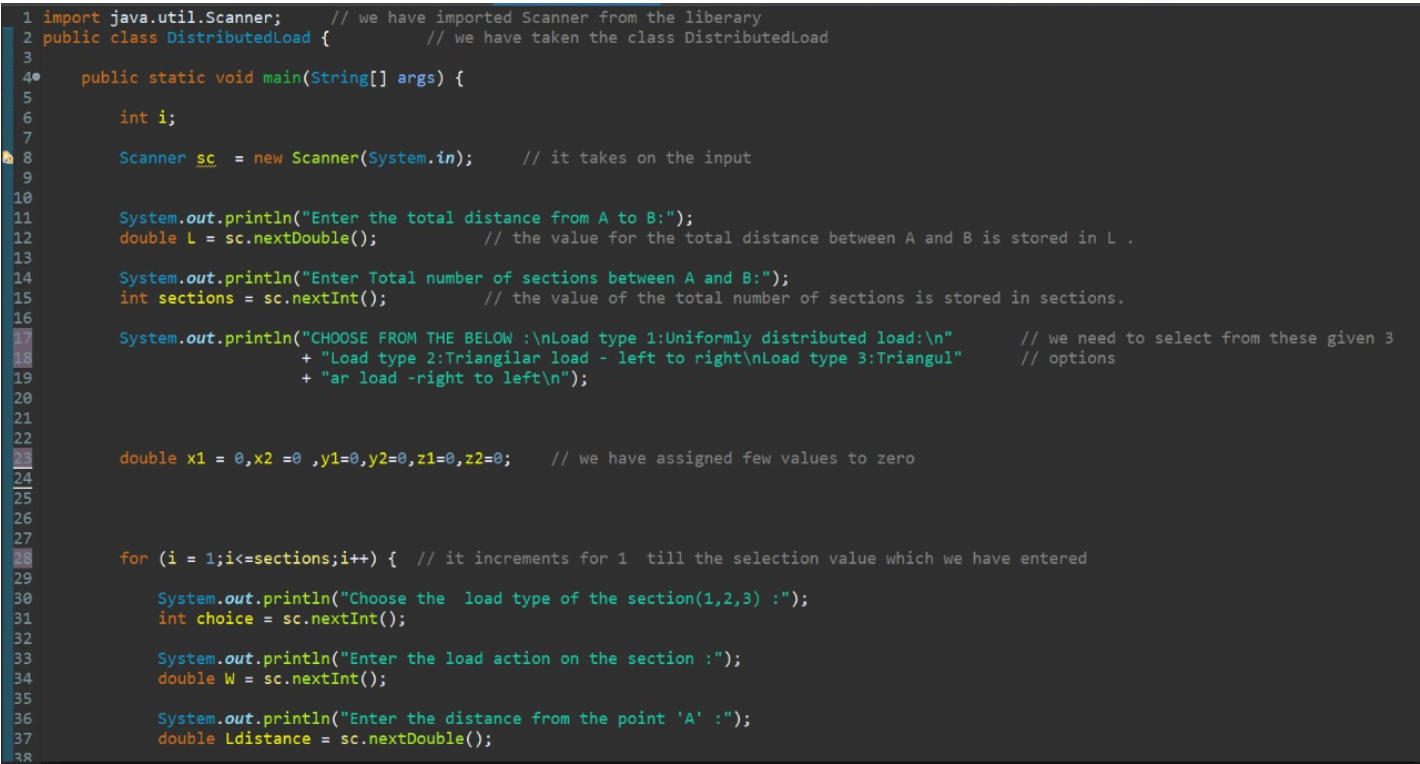
**Solution for (b) using the above code:**

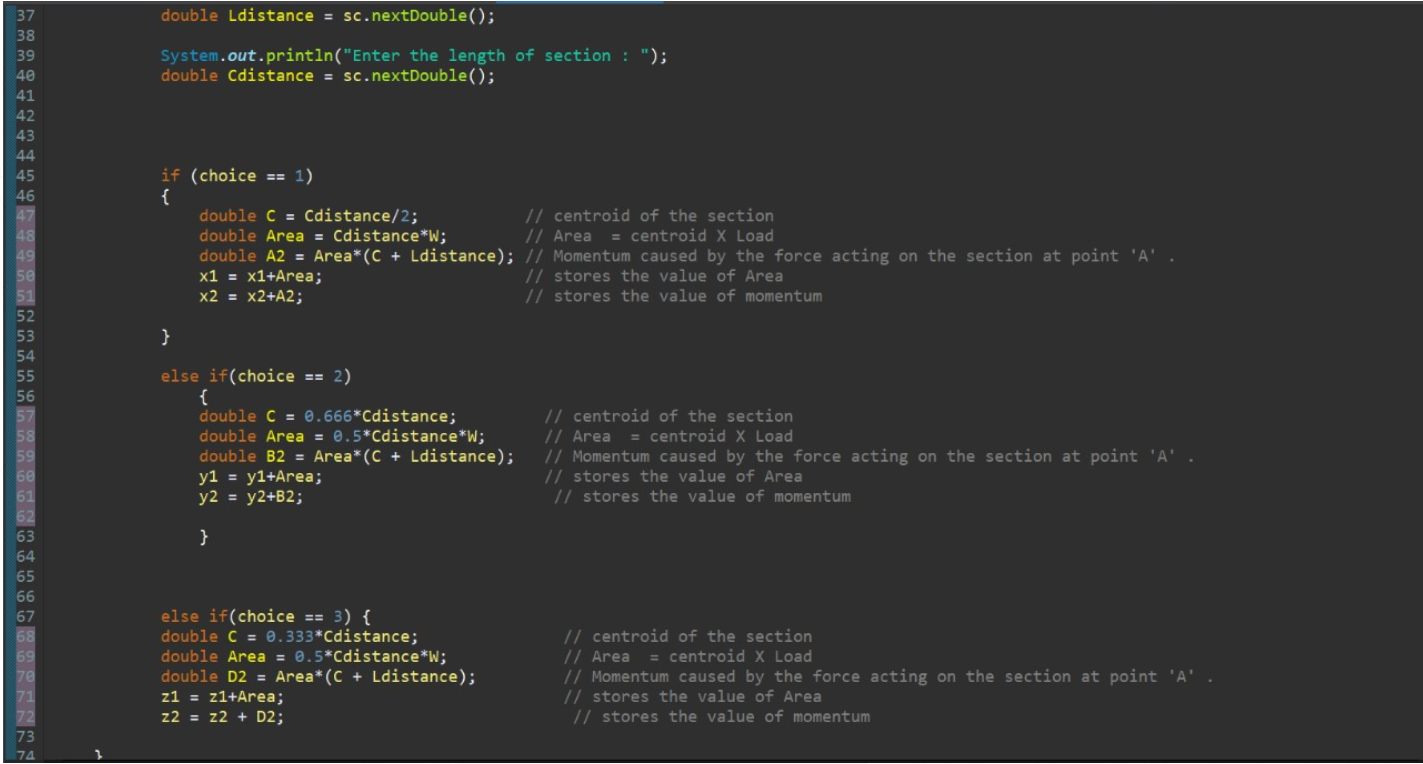


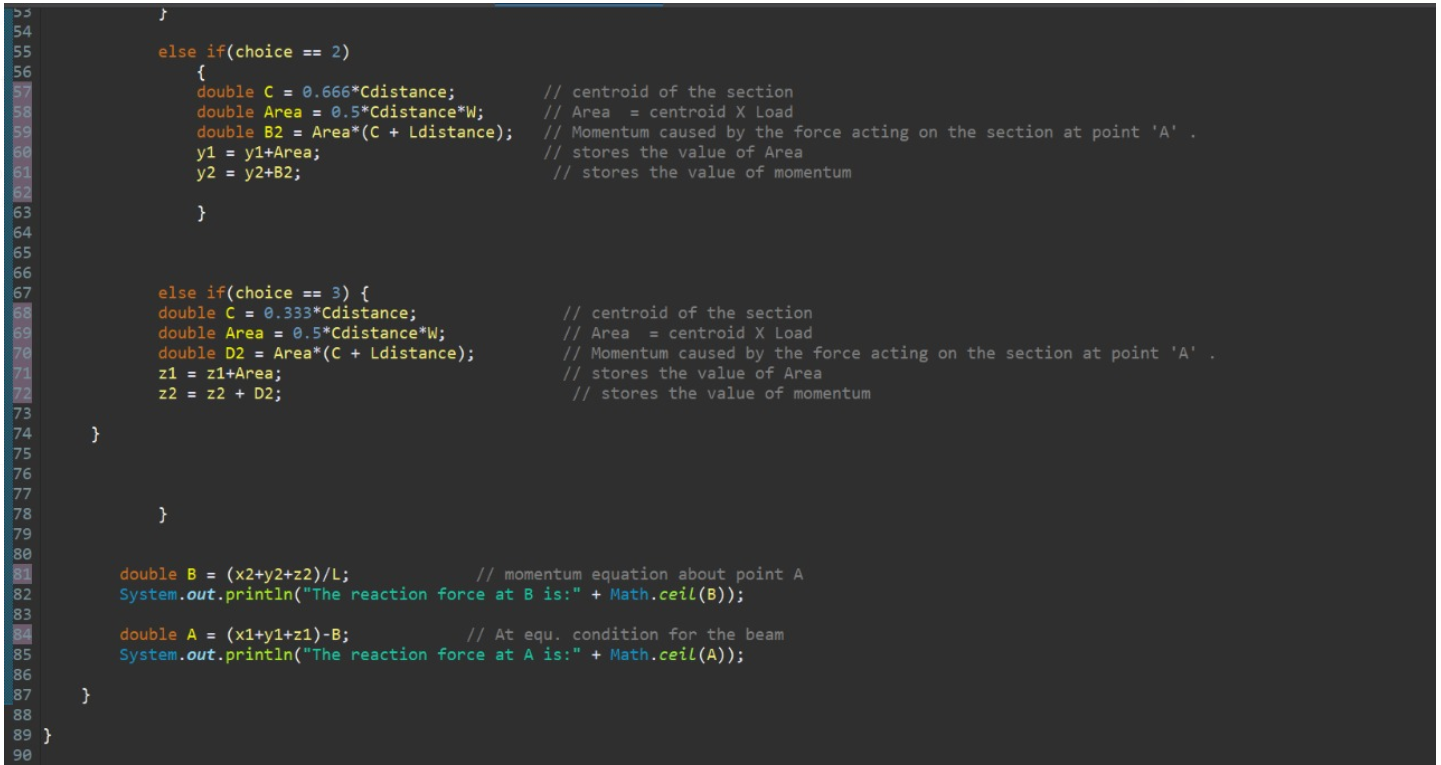
**Solution for (c) using the above code:**



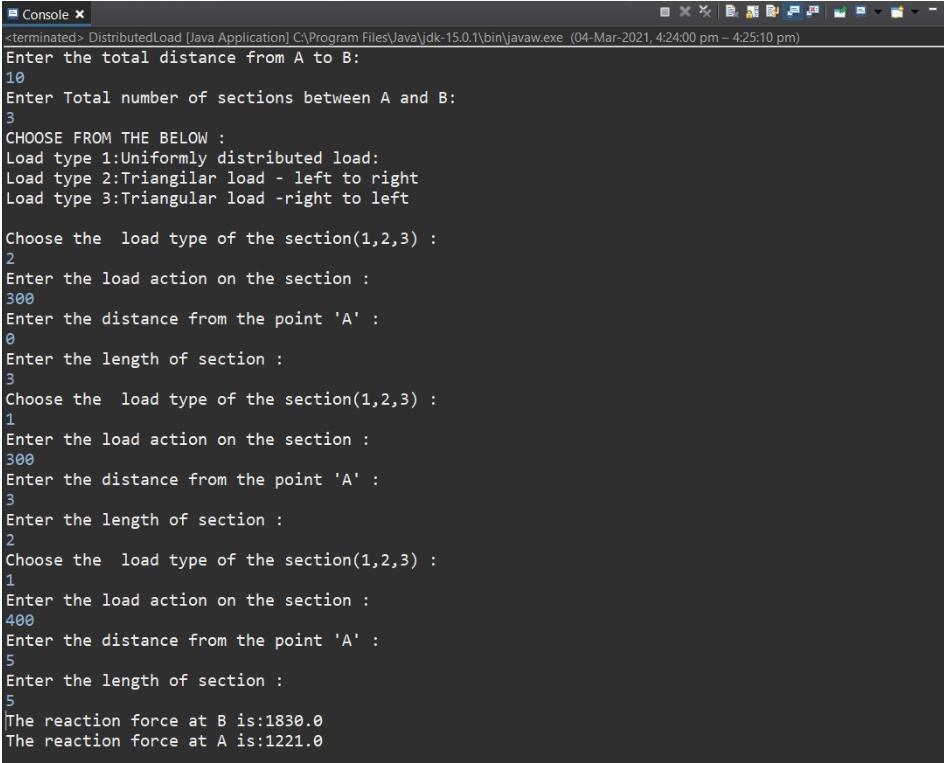
**JAVA code:**



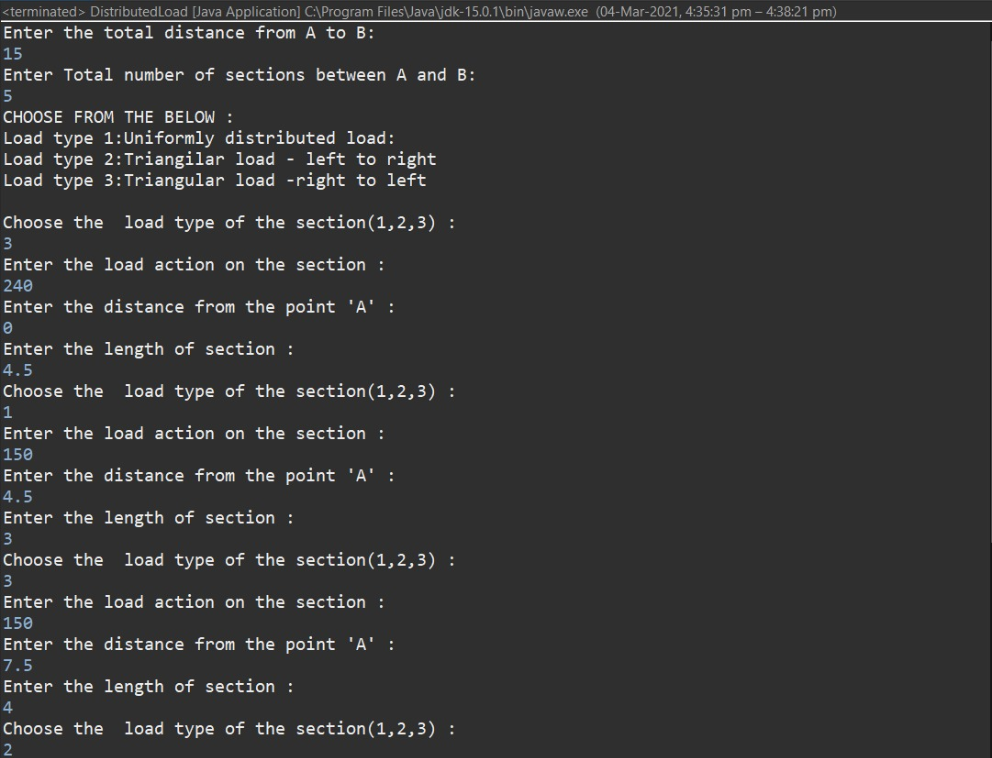


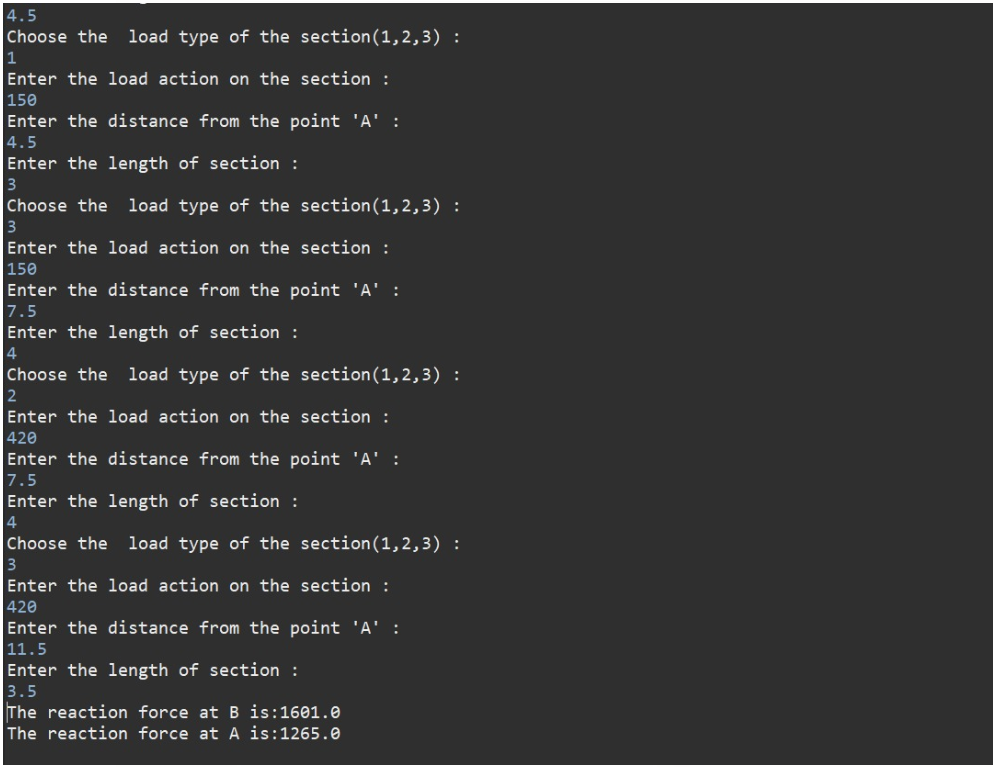


**Solution for (b) using the above code:**



**Solution for (c) using the above code:**





**PYTHON code:**