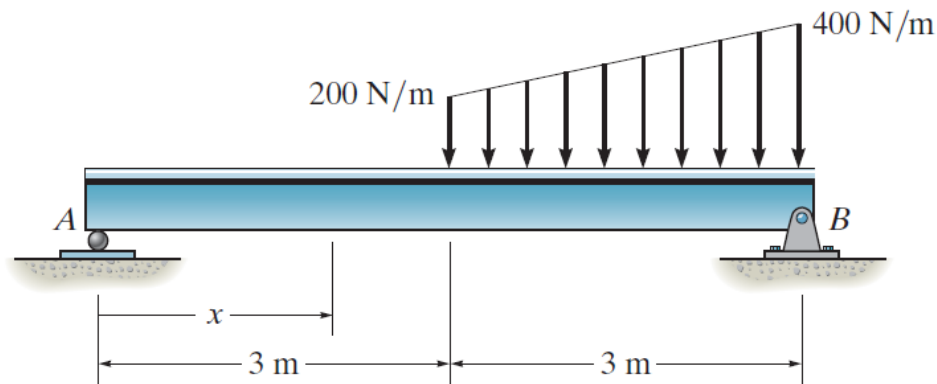


## problem 6-35

**6-35.** Draw the shear and moment diagrams for the beam and determine the shear and moment as functions of  $x$ .



**Prob. 6-35**

**beam**

```
u = symunit;
x = sym('x');
E = sym('E');
I = sym('I');

old_assum = assumptions;
clearassum;
args = {'mode' 'factor'};
wf = findpoly(1, 'thru', [3*u.m -200*u.N/u.m], ...
               [6*u.m -400*u.N/u.m], args{:});

b = beam; %(N,m)
b = b.add('reaction', 'force', 'Ra', 0);
b = b.add('reaction', 'force', 'Rb', 6*u.m);
b = b.add('distributed', 'force', wf, [3 6]*u.m);
b.L = 6*u.m;
```

**elastic curve**

```
[y(x,E,I) dy(x,E,I) m v w r] = b.elastic_curve(x, 'factor'); %#ok
y
```

$y(x, E, I) =$

$$\begin{cases} -\frac{5x(639\text{ m}^2 - 20x^2)}{3EI} \text{ N} & \text{if } x \leq 3\text{ m} \\ \frac{5(x - 6\text{ m})(-x^4 - 6x^3\text{ m} + 114x^2\text{ m}^2 + 144x\text{ m}^3 + 162\text{ m}^4)}{9EI} \frac{\text{N}}{\text{m}^2} & \text{if } 3\text{ m} < x \end{cases}$$

dy

dy(x, E, I) =

$$\begin{cases} -\frac{5(213\text{ m}^2 - 20x^2)}{EI} \text{ N} & \text{if } x \leq 3\text{ m} \\ -\frac{5(5x^4 - 450x^2\text{ m}^2 + 1080x\text{ m}^3 + 702\text{ m}^4)}{9EI} \frac{\text{N}}{\text{m}^2} & \text{if } 3\text{ m} < x \end{cases}$$

m

m(x) =

$$\begin{cases} 200x \text{ N} & \text{if } x < 3\text{ m} \\ -\frac{100(x - 6\text{ m})(x^2 + 6x\text{ m} - 9\text{ m}^2)}{9} \frac{\text{N}}{\text{m}^2} & \text{if } 3\text{ m} \leq x \end{cases}$$

v

v(x) =

$$\begin{cases} 200 \text{ N} & \text{if } x < 3\text{ m} \\ \frac{100(15\text{ m}^2 - x^2)}{3} \frac{\text{N}}{\text{m}^2} & \text{if } 3\text{ m} \leq x \end{cases}$$

w

w(x) =

$$\begin{cases} 0 & \text{if } x < 3\text{ m} \\ -\frac{200x}{3} \frac{\text{N}}{\text{m}^2} & \text{if } 3\text{ m} \leq x \end{cases}$$

## reactions

Ra = r.Ra %ok

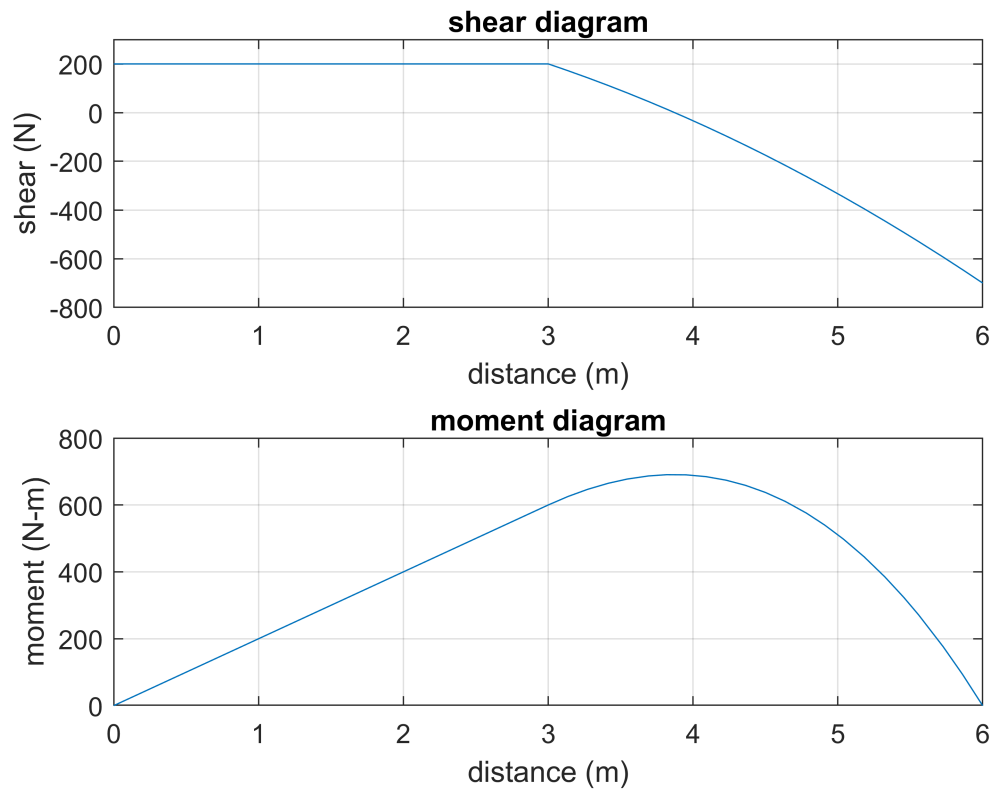
Ra = 200 N

Rb = r.Rb %ok

Rb = 700 N

## shear and bending moment diagrams

```
beam.shear_moment(m, v, [0 6], {'N' 'm'});  
subplot(2,1,1);  
axis([0 6 -800 300]);  
subplot(2,1,2);  
axis([0 6 0 800]);
```



## clean up

```
setassum(old_assum);  
clear args old_assum Ra Rb;
```