

## Example 4.9 - Statically indeterminate beam

Define singularity function

```
[ > sfn := proc(x,a,n) (x-a)^n * Heaviside(x-a) end;
```

Enter displacement function (developed manually by multiple integration)

```
[ > y := (x)->  
    (Ra/6)*sfn(x,0,3)+(Rb/6)*sfn(x,7.5,3)+(Rc/6)*sfn(x,15,3)-(10/24)*s  
    fn(x,0,4)+c1*x+c2;
```

Define constraints

Vertical equilibrium:

```
[ > eq1 := 0=Ra+Rb+Rc-(10*15);
```

Moment equilibrium

```
[ > eq2 := 0=(10*15*7.5)-Rb*7.5-Rc*15;
```

Zero displacement at three constraints:

```
[ > eq3 := y(0)=0;
```

```
[ > eq4 := y(7.5)=0;
```

```
[ > eq5 := y(15)=0;
```

Solve constraint equations for unknown parameters:

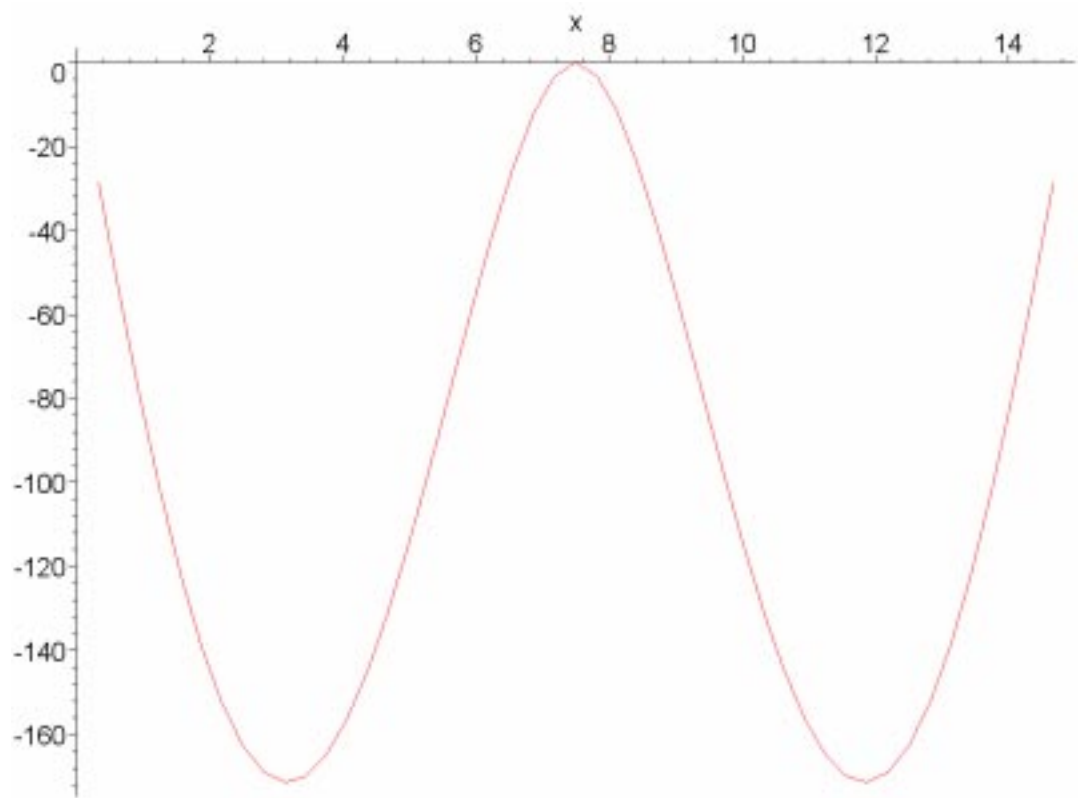
```
[ > solve({eq1,eq2,eq3,eq4,eq5},{Ra,Rb,Rc,c1,c2});  
    {c2 = 0, Ra = 28.12500000, c1 = -87.89062500, Rb = 93.75000000, Rc = 28.12500000 }
```

Assign solution to parameters:

```
[ > assign(%);
```

Plot deflection function:

```
[ > plot(y(x),x=0..15);
```



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### 3.11 Mechanics of Materials

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