```
syms l E A a F s
A = 10; %mm^2
E = 200000; %N/mm^2
l = 300 % mm
a = 0.1 % N/mm/mm
F = 2000 %N
N1 = (l-s)/l;
N2 = s/l;
N = [N1 N2]
% Find B
B = diff(N, s)
%Find K
prod = B.'*B;
simple = simplify(prod);
integralB = int(simple, s)
K = (A*E/l)*[1, -1, 0, 0;
   -1, 2, -1, 0;
   0, -1, 2, -1;
   0, 0, -1, 1];

%Find Q
Q_d = ((a*l.^2)/54)*[1, 5, 11, 10];
Q_c = F*[0, 1/2, 1/2, 1];
Q_t = Q_c + Q_d;
Q_d_new = ((a*l.^2)/54)*[5, 11, 10];
Q_c_new = F*[1/2, 1/2, 1];
Q_t_new = Q_d_new + Q_c_new

%Solve
K_new = [K(2, 2), K(2, 3), K(2,4);
        K(3,2), K(3,3), K(3,4);
        K(4,2), K(4, 3), K(4,4)]
u = inv(K_new)*Q_t_new.'
sigma1 = E*B*[0; u(1)]
sigma2 = E*B*[u(1); u(2)]
sigma3 = E*B*[u(2); u(3)]

stress1 = simplify(sigma1);
stress2 = simplify(sigma2);
stress3 = simplify(sigma3);

x1 = 0:1/50:1/3;
x2 = 1/3:1/50:2/3;
x3 = 2/3:1/50:1;
RR_u1 = x1*(a*l^2)/(27*E*A);
RR_u2 = (a*l^3)/(81*E*A) + x2*((7*a*l^2)/(27*E*A) + (3*F)/(2*A*E));
RR_u3 = (8*a*l^3)/(81*E*A) + (F*l)/(E*A) + x3*((3*F)/(a*E) + (19*a*l^2)/
(27*E*A));
figure
plot(x1, RR_u1, x2, RR_u2, x3, RR_u3)


l =
```

```
   300

a =

    0.1000

F =

        2000

N =

[1 - s/300, s/300]

B =

[-1/300, 1/300]

integralB =

[ s/90000, -s/90000]
[-s/90000,  s/90000]

Q_t_new =

   1.0e+03 *

    1.8333    2.8333    3.6667

K_new =

   1.0e+04 *

    1.3333   -0.6667         0
   -0.6667    1.3333   -0.6667
         0   -0.6667    0.6667

u =

    1.2500
    2.2250
    2.7750

sigma1 =
```

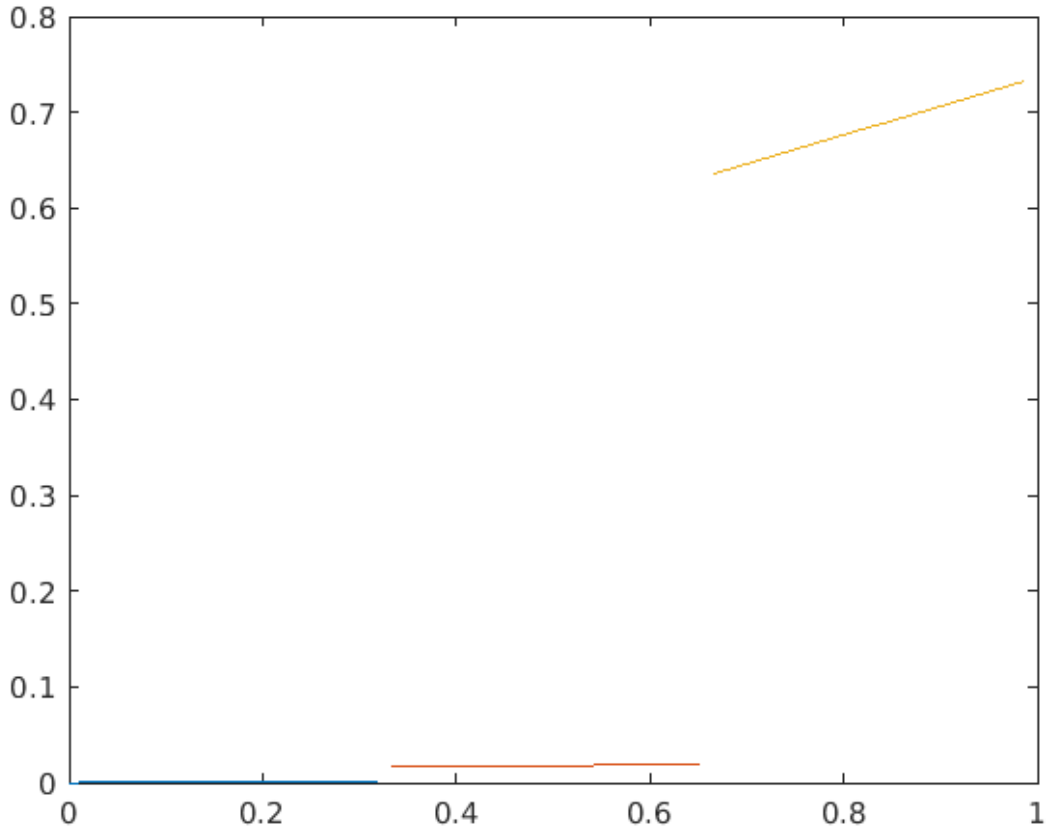
```
2500/3
```

```
sigma2 =

650
```

```
sigma3 =

1100/3
```



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