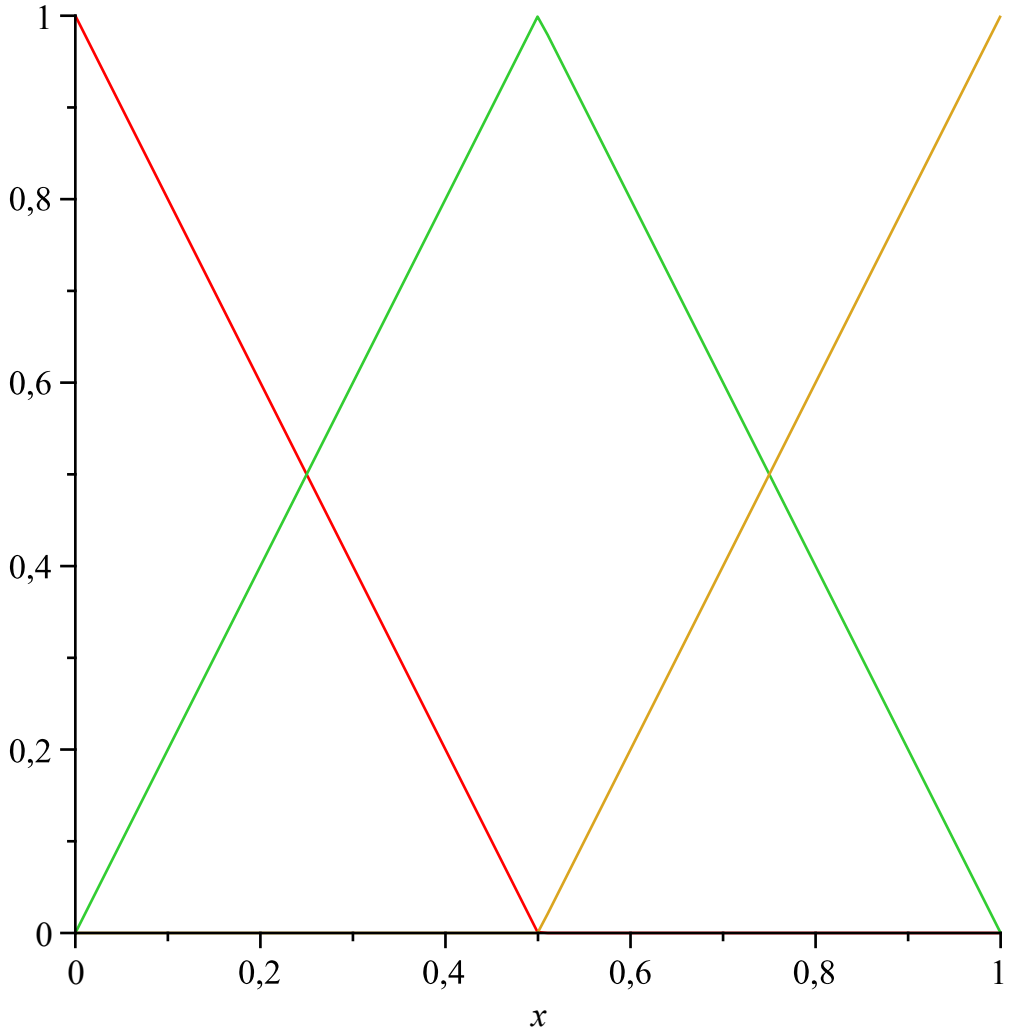
```
> with(LinearAlgebra) :
> phi := xi → piecewise(xi ≥ -1 and xi < 0, 1 + xi, xi ≥ 0 and xi ≤ 1, 1 - xi, 0) :
> plot(phi(xi), xi = -1 ..1) :
> X := Matrix(3, 1, [0., 0.5, 1.]) :
> Phi := Matrix(3, 1, [phi((x - X[1, 1])/.5), phi((x - X[2, 1])/.5), phi((x - X[3, 1])/.5)]) :
> plot([Phi[1, 1], Phi[2, 1], Phi[3, 1]], x = 0 ..1);
```




```
> K := subs(EA = 1.0e7, Matrix(2, 2, [int(EA·diff(Phi[2, 1], x)·diff(Phi[2, 1], x), x = 0 ..1),
      int(EA·diff(Phi[2, 1], x)·diff(Phi[3, 1], x), x = 0.5 ..1.), int(EA·diff(Phi[3, 1], x)
      ·diff(Phi[2, 1], x), x = 0.5 ..1.), int(EA·diff(Phi[3, 1], x)·diff(Phi[3, 1], x), x = 0.5 ..1.)]
      )) :

> f := subs(p0 = 1.0e4, F2 = 1.0e4, F3 = 1.0e4, Matrix(2, 1, [int(p0·(1 - x)· Phi[2, 1], x = 0
      ..1) + F2, int(p0·(1 - x)·Phi[3, 1], x = 0.5 ..1.) + F3])) :
> U := Multiply(MatrixInverse(K), f) :
> u := Phi[1, 1]·0 + Phi[2, 1]·U[1, 1] + Phi[3, 1]·U[2, 1] :
> Uexata := piecewise(x ≥ 0 and x ≤ L/2, x/(6·L·EA)·(p0·(x^2 - 3·L·x + 3·L^2) + 12·F·L), x
```

$> \frac{L}{2}$ **and** $x \le L, \frac{1}{6 \cdot L \cdot EA} \cdot \left(p0 \cdot x \cdot \left(x^2 - 3 \cdot x \cdot L + 3 \cdot L^2 \right) + 3 \cdot F \cdot L \cdot (2 \cdot x + L) \right) \Big) :$

> $uexata := subs(p0 = 1.0e4, F = 1.0e4, L = 1, EA = 1.0e7, Uexata) :$

> $plot([u, uexata], x = 0..1, y = 0..0.003);$