

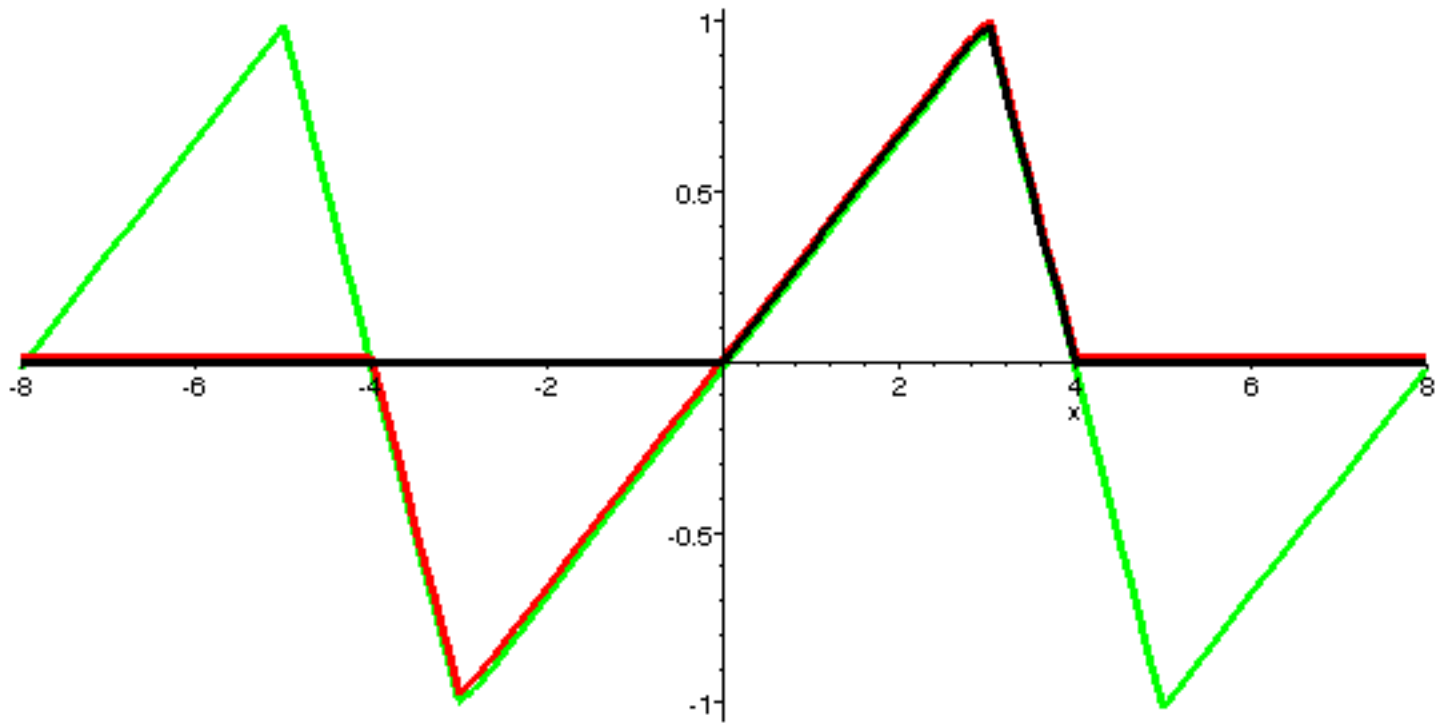
Module 24: Structure of Solutions

We contrast three situations.

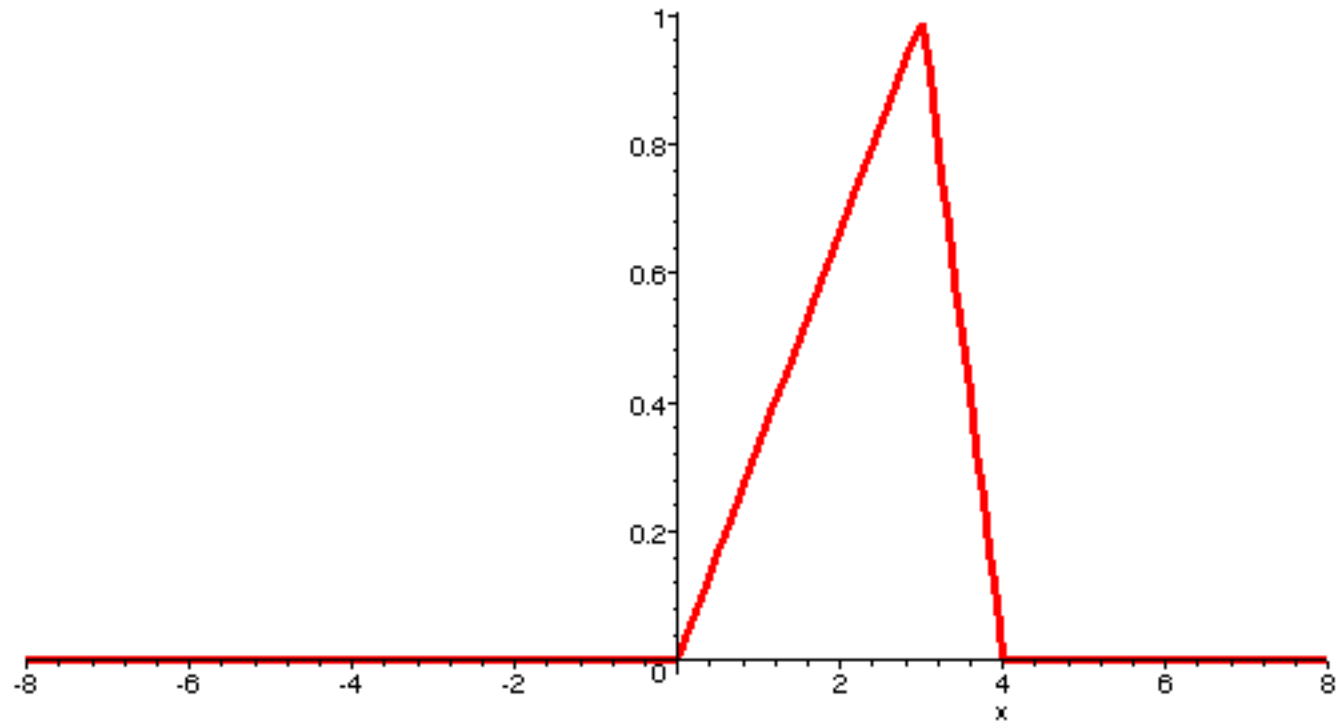
Situations:

- (1) x is any number on the real line -- an infinite string,
- (2) x is positive -- a half infinite string,
- (3) x is in an interval -- a finite string.

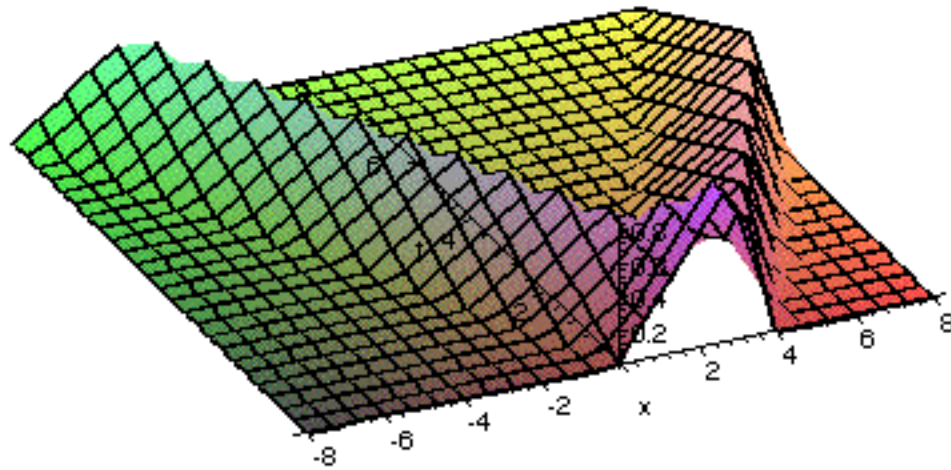
G taken as zero; starting f, with extensions:



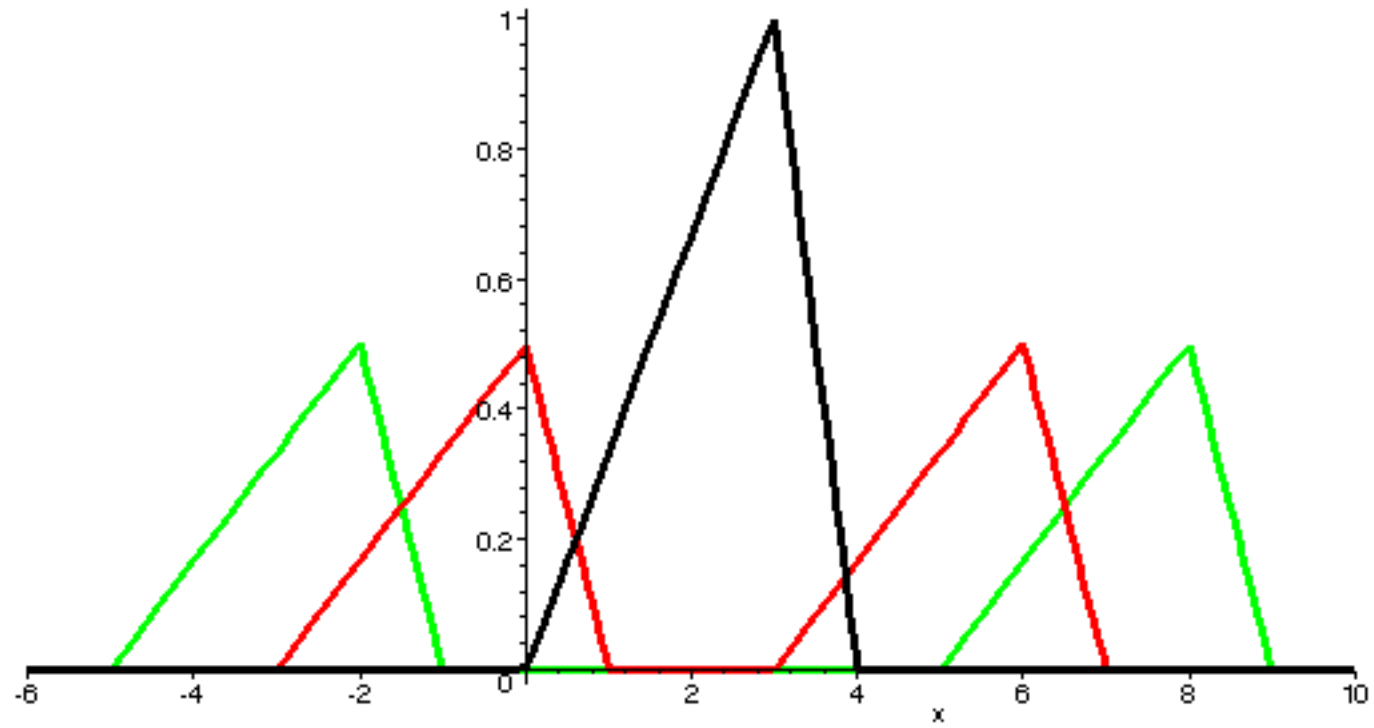
Graph of F_1 on the infinite interval.



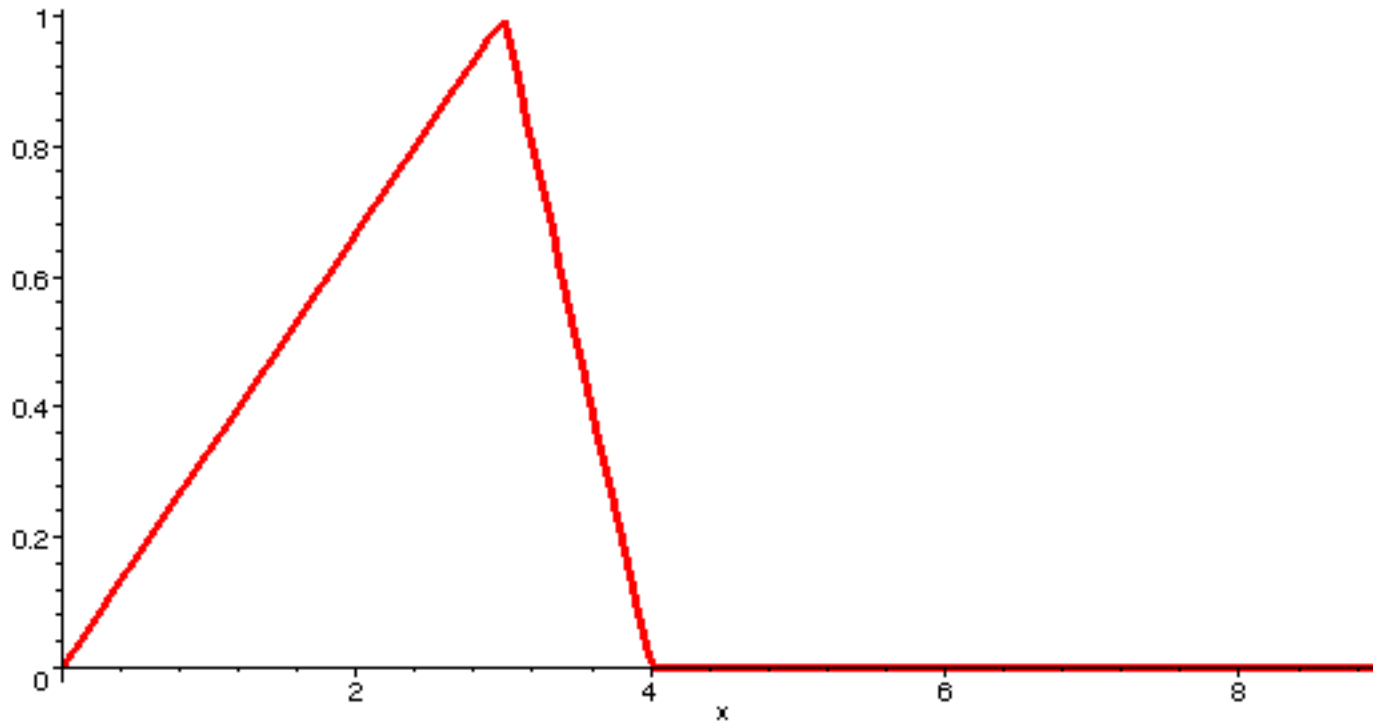
$$U(t, x) = \frac{F_1(x+t) + F_1(x-t)}{2}$$



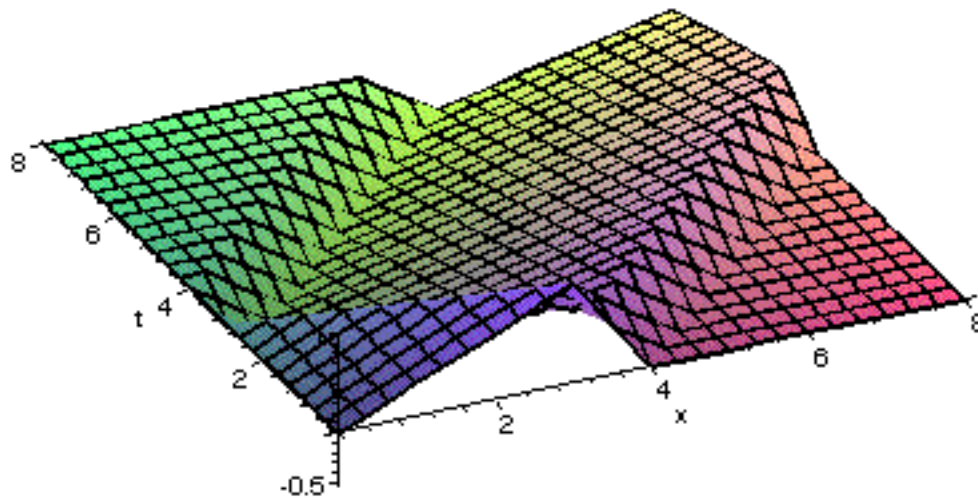
Snapshots for the infinite string:



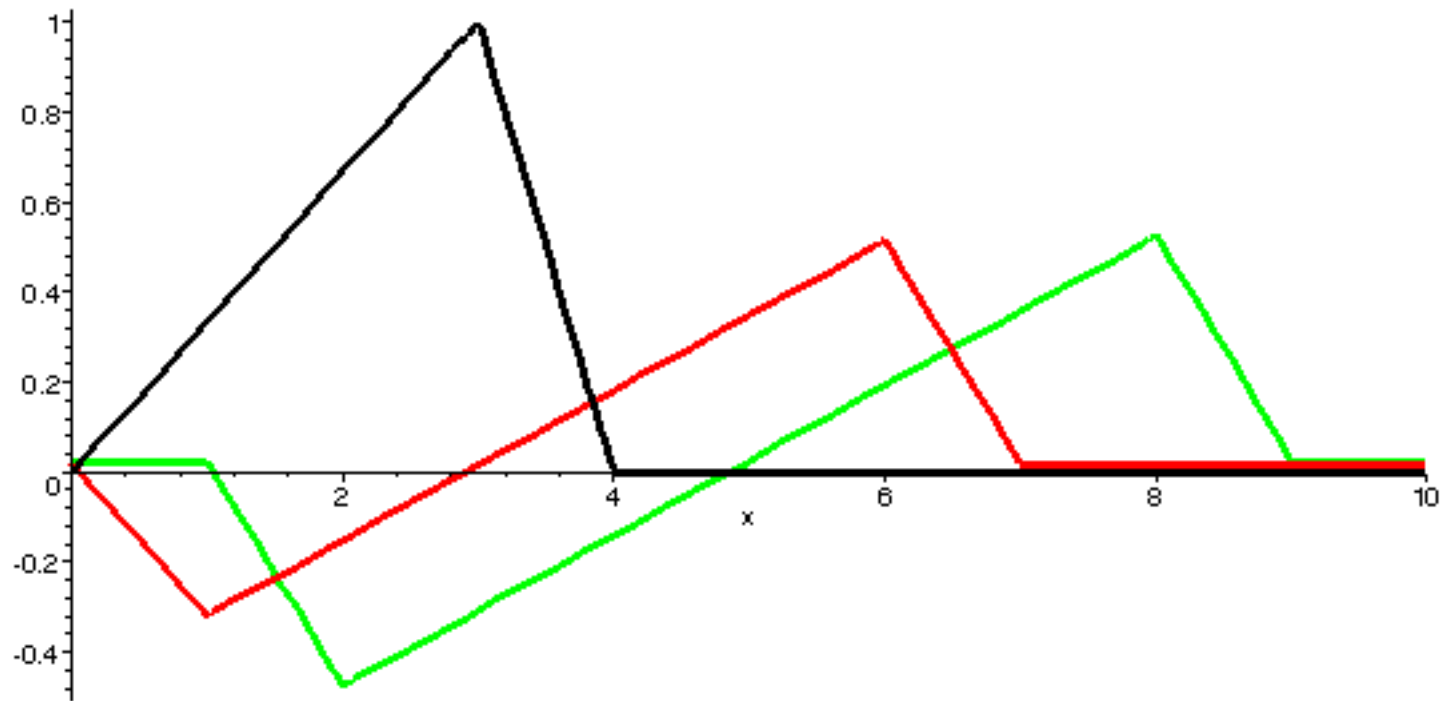
Graph of F_2 on the half infinite interval.



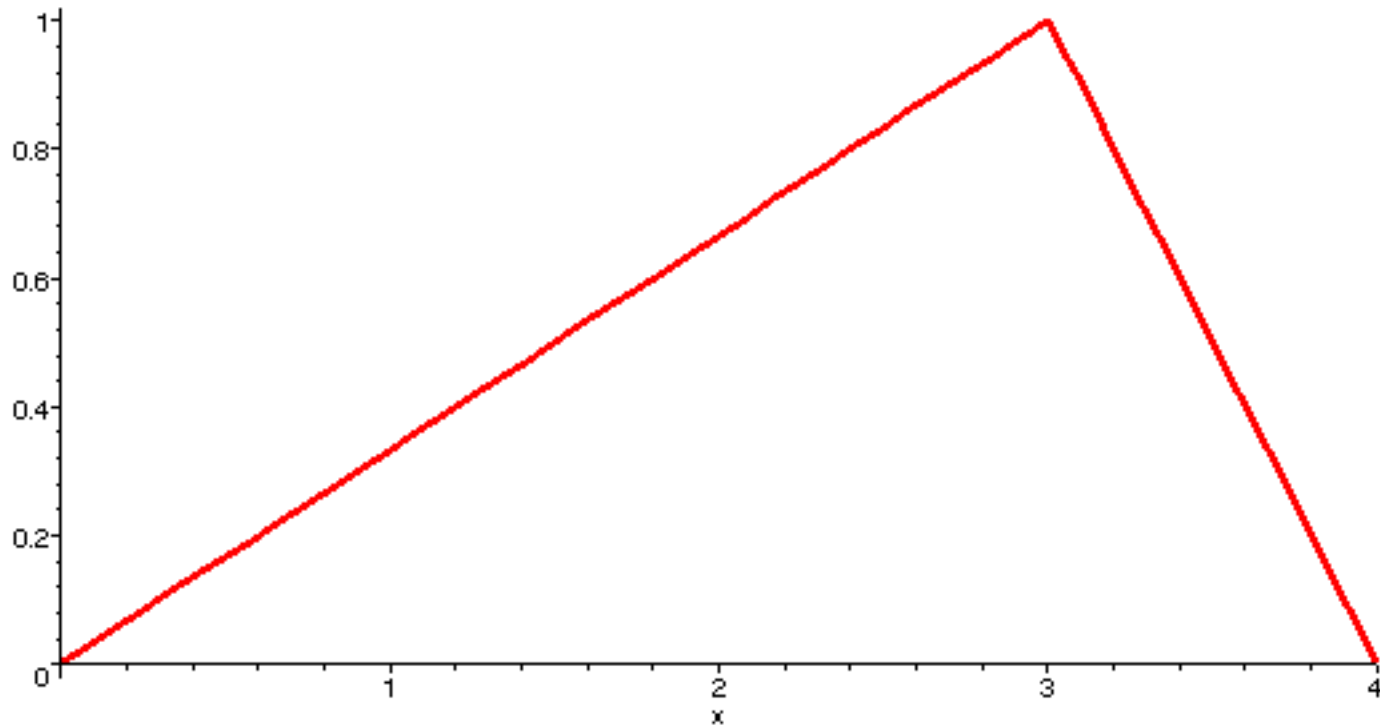
$$U(t, x) = \frac{F_2(x+t) + F_2(x-t)}{2}$$



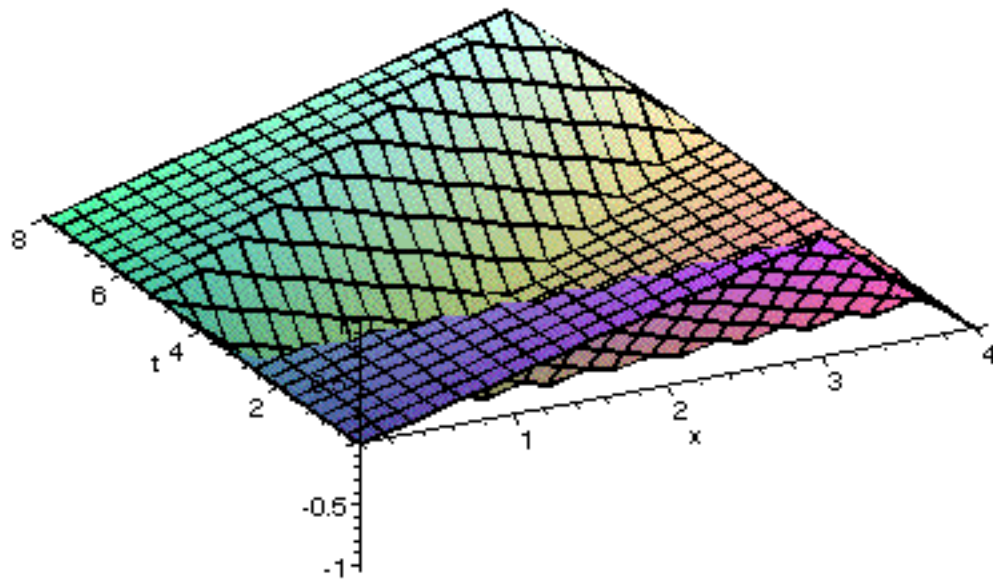
Snapshots for the half infinite string:



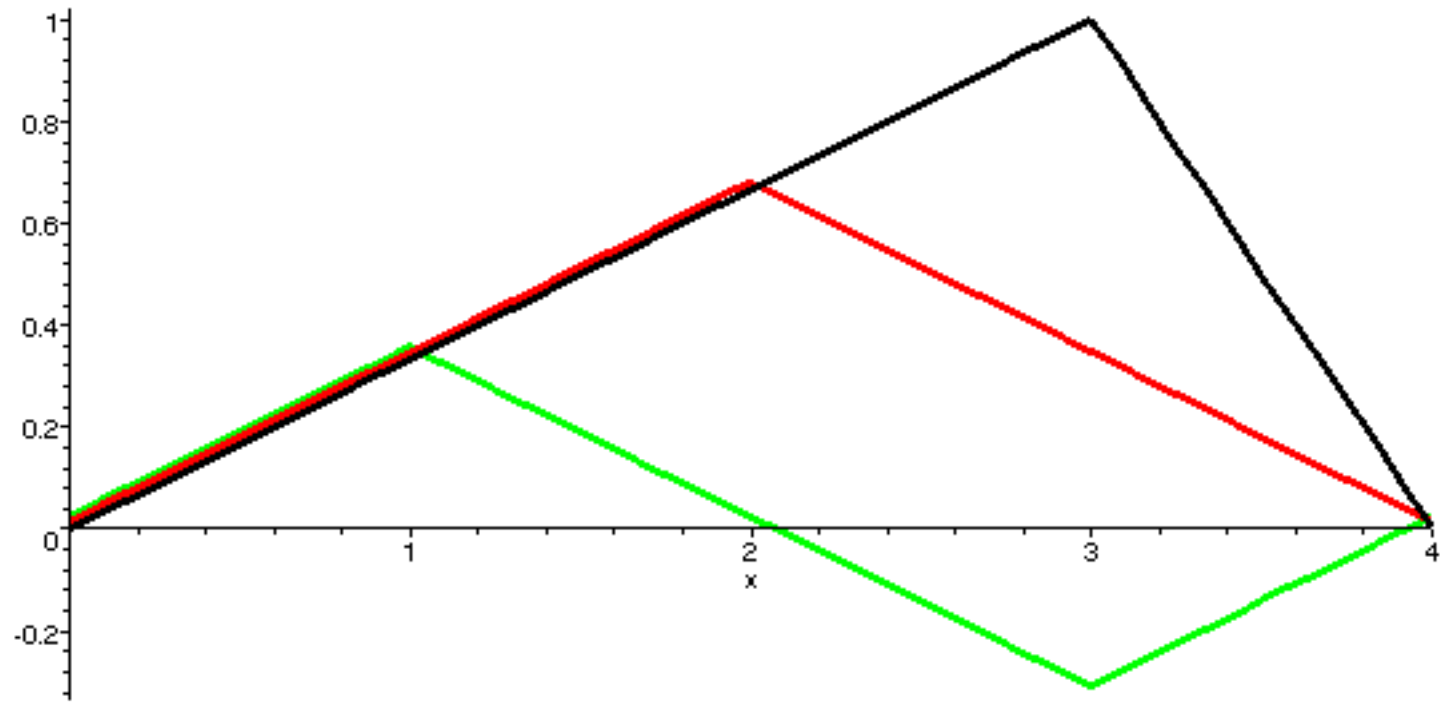
Graph of F_3 on the finite interval.



$$U(t, x) = \frac{F_3(x+t) + F_3(x-t)}{2}$$



Snapshots for the finite string:



Character of solutions:

(1) Bumps split.

(2) There are weak solutions.

(3) Points in the plane have a domain of dependence.

(4) The model incorporates the speed of travel.

Assignment: See Maple Worksheet.

In this Module 24, we have

- (1) compared solutions from the perspective of the length of the string.
- (2) taken note of the common structure of solutions.