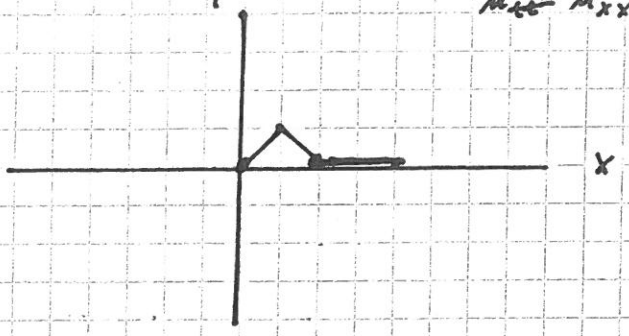
Travelling Wave Exs. using d'Alembert's Formula

$u_{tt} = u_{xx}$

(1) $y = f(x)$

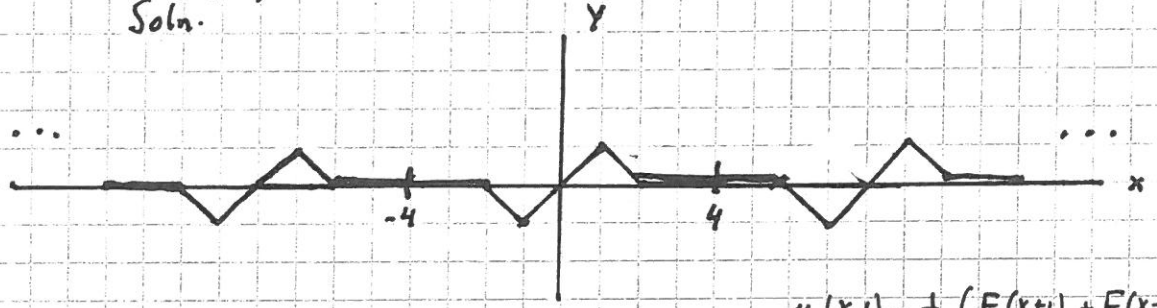
$0 \le x \le 4$



Find $u(x,1), u(x,2), \ldots, u(x,8)$.

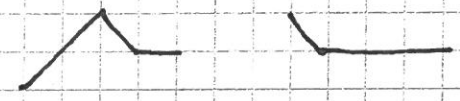
Soln.

$y = F(x)$



$u(x,1) = \frac{1}{2}\left(F(x+1) + F(x-1)\right)$

Solutions



$t = 1$

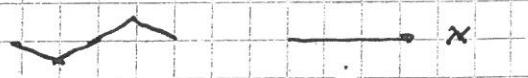
$u(x,2)$

$u(x,3)$

$u(x,4)$

$u(x,5)$

$u(x,6)$



$u(x,7)$

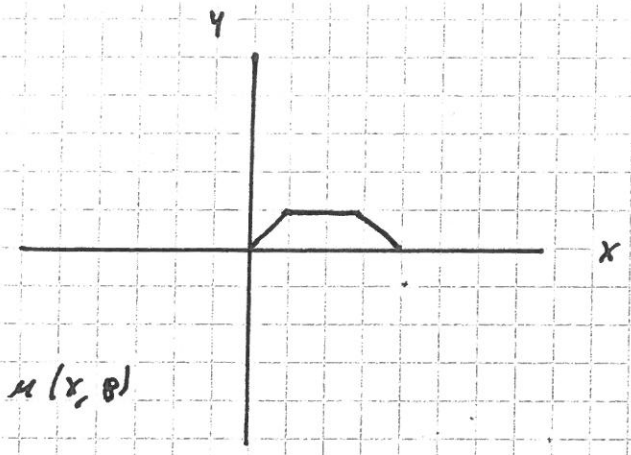
$u(x,8)$

in general period in t

$$\frac{2\pi}{\frac{\pi c}{L}} = \frac{2L}{c}$$

$\frac{2L}{c} = 8$ in this example

(2)

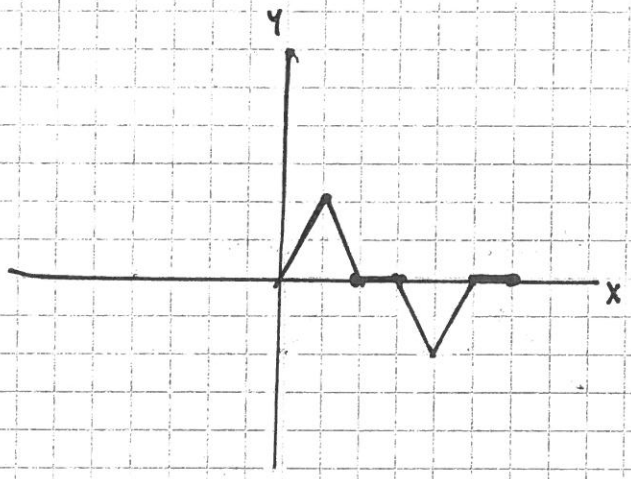


$y = f(x)$

$0 \le x \le 4$

Find $u(x,1), \ldots u(x,8)$

(3)

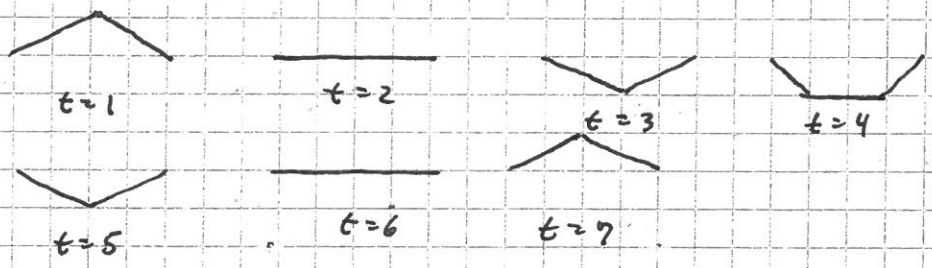


$y = f(x)$

$0 \le x \le 6$

Find $u(x,1)$.

Solutions to (2).



period is 8