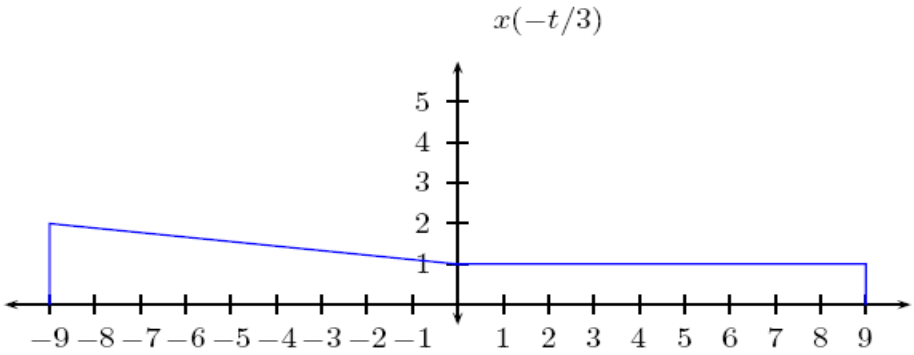
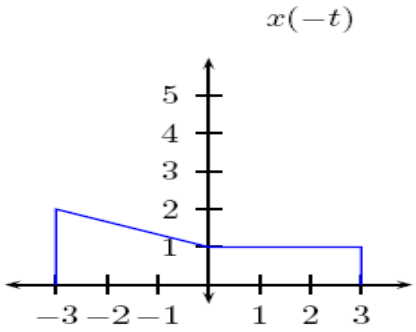
Chapter 1 solutions

1.1 (a)

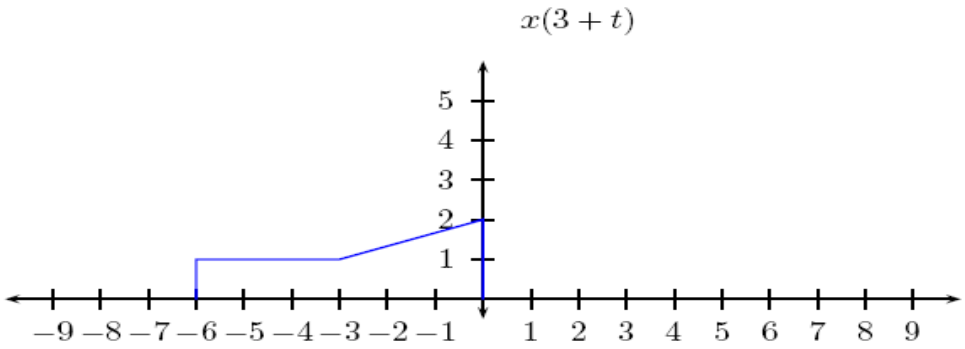
(i)



(ii)

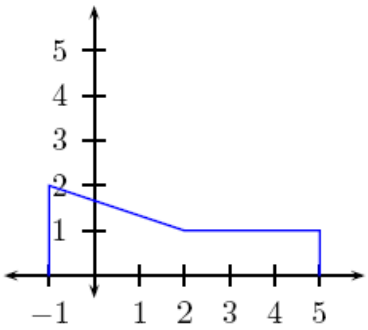


(iii)



(iv)

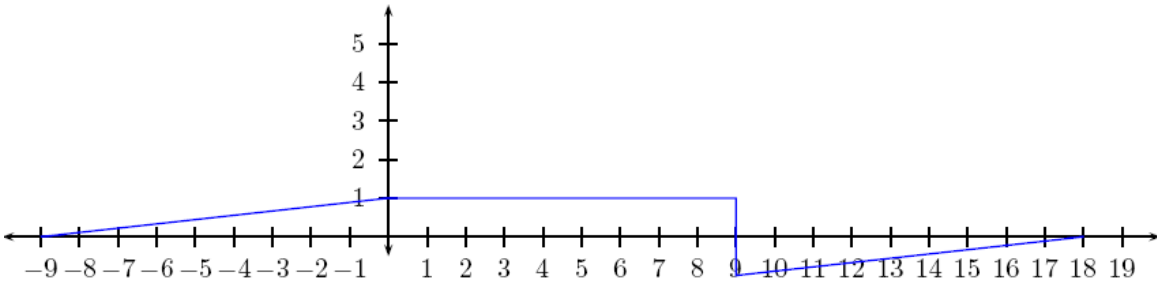
$x(2-t)$



(b)

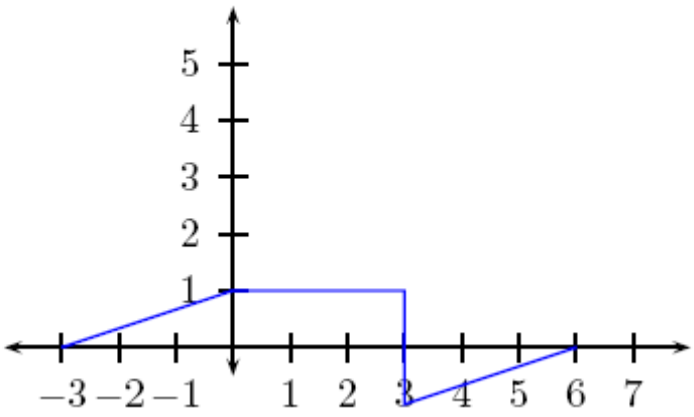
(i)

$x(-t/3)$

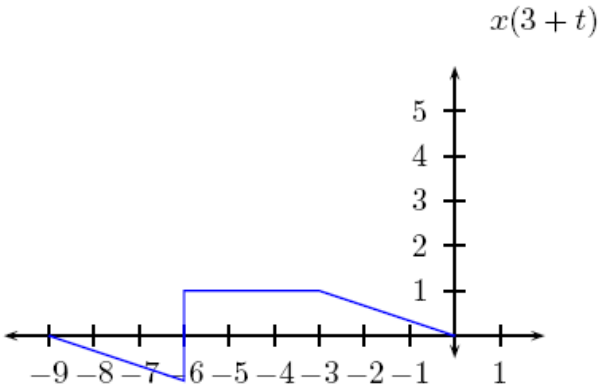


(ii)

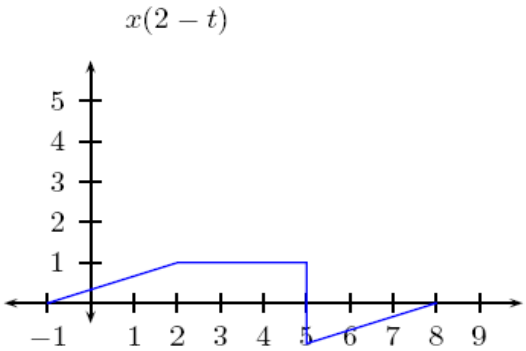
$x(-t)$



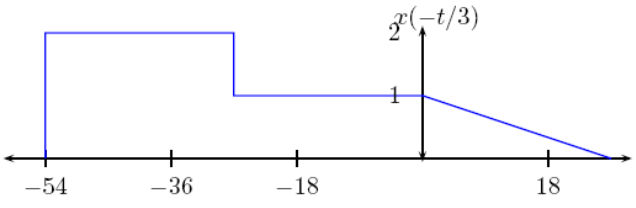
(iii)



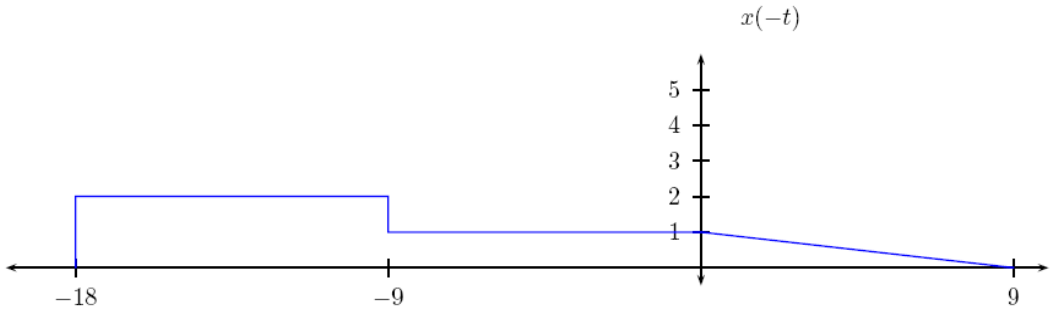
(iv)



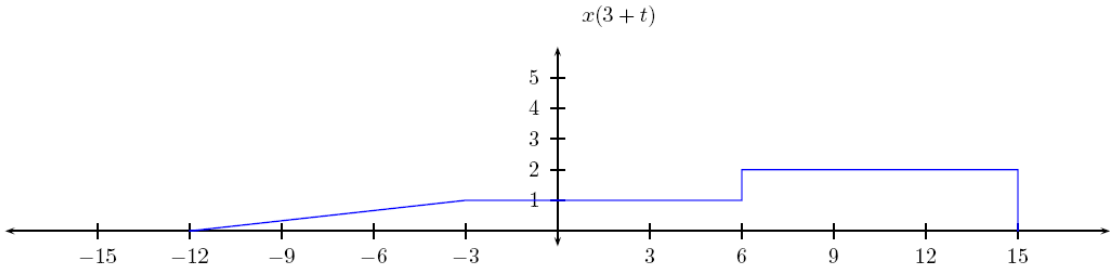
(c) (i)



(ii)



(iii)



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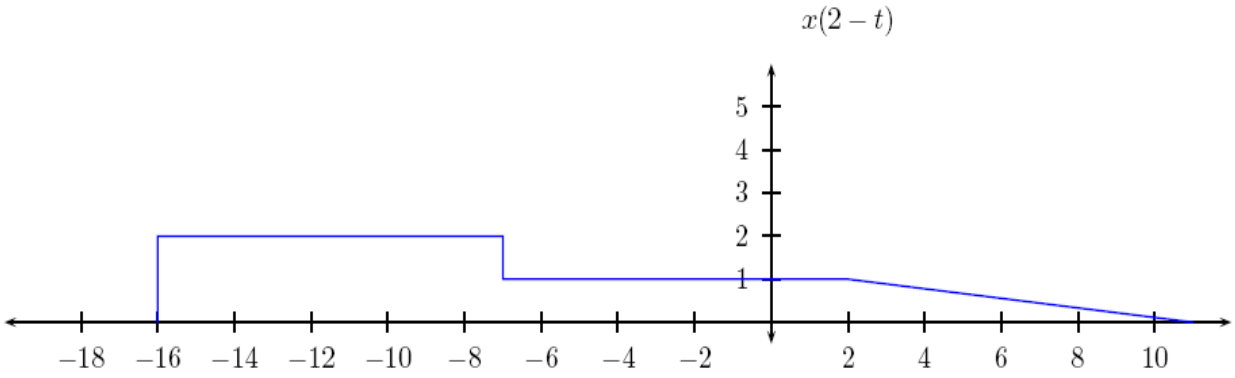
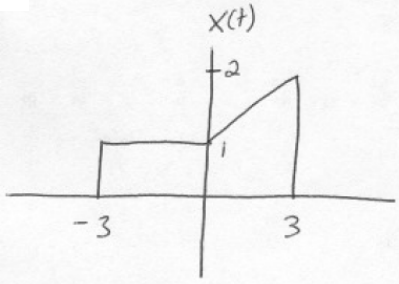
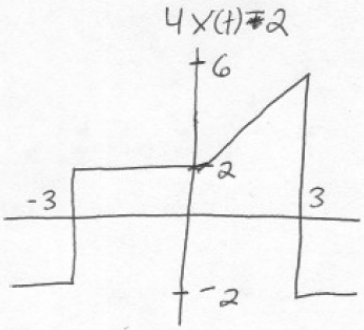


1.2

(a)



i)



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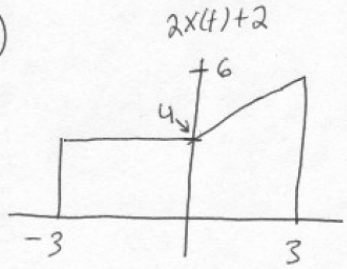

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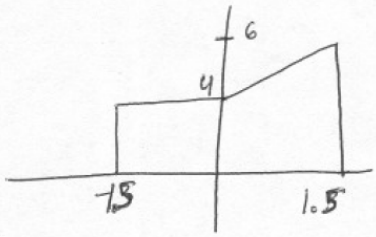

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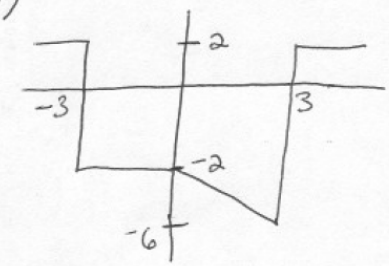
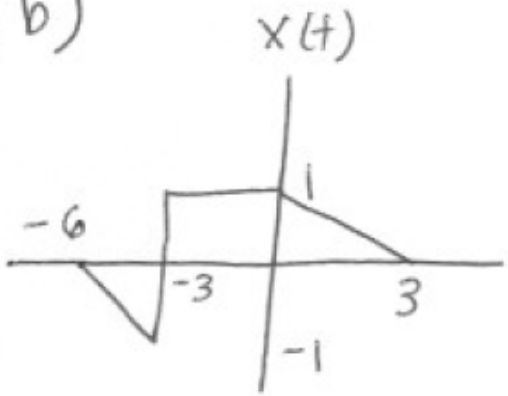
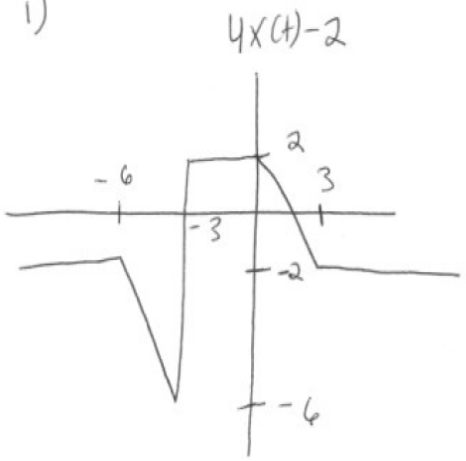


(b)



i)



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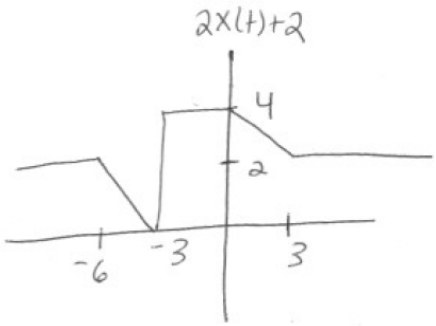

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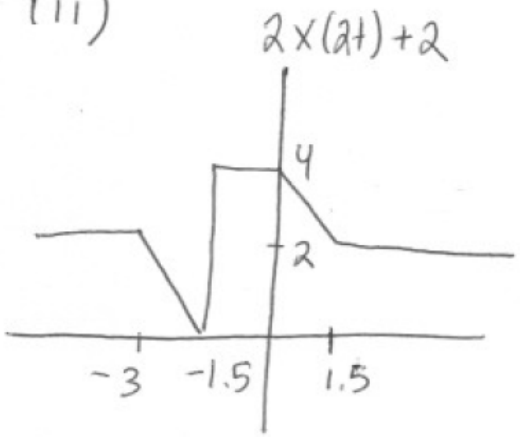

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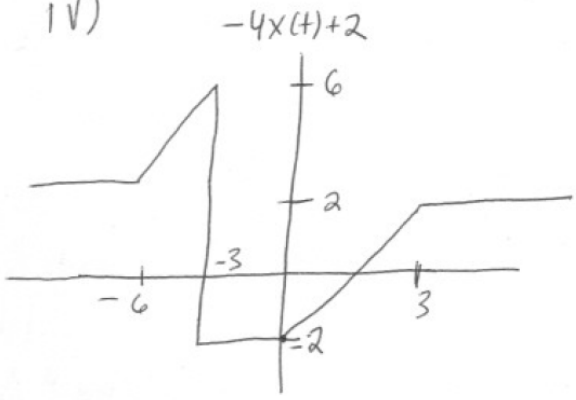
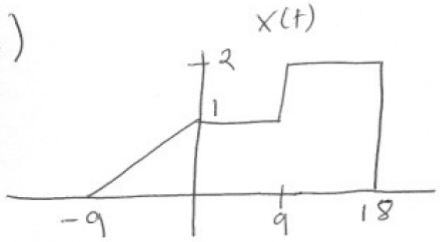
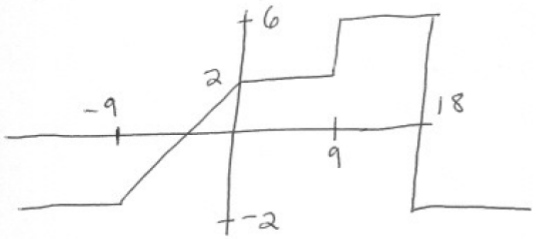


1.2

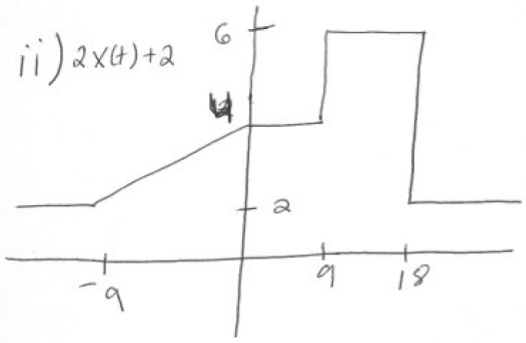
(c)



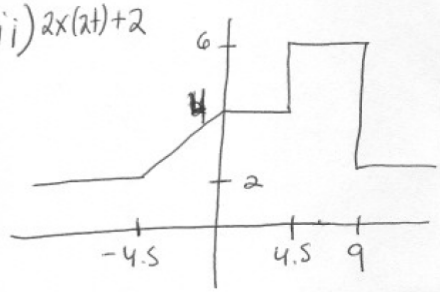
i) $4x(t)-2$



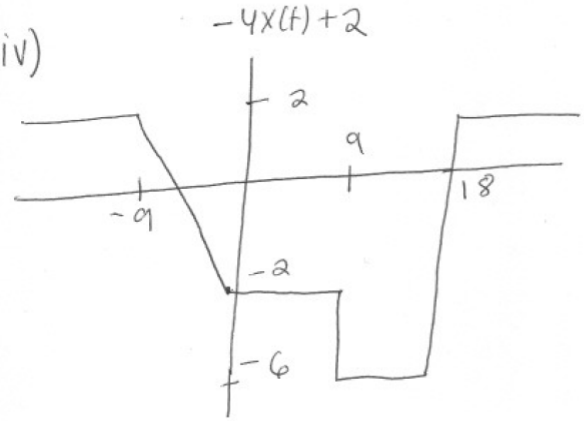
ii) $2x(t)+2$



iii) $2x(2t)+2$



iv) $-4x(t)+2$



1.3

(a) $y(t) = -0.5(x(2t-4)) + 1.5$

(b)

t	y(t)	2t-4	-0.5(x(2t-4))+1.5
2	1.5	0	1.5
3	-1	2	-1
4.5	1.5	5	1.5

(c) $x(t) = -2y(\frac{t+4}{2}) + 3$

(d)

t	x(t)	$\frac{t+4}{2}$	$-2y(\frac{t+4}{2}) + 3$
0	0	2	0
4	-3	4	-3
5	0	4.5	0

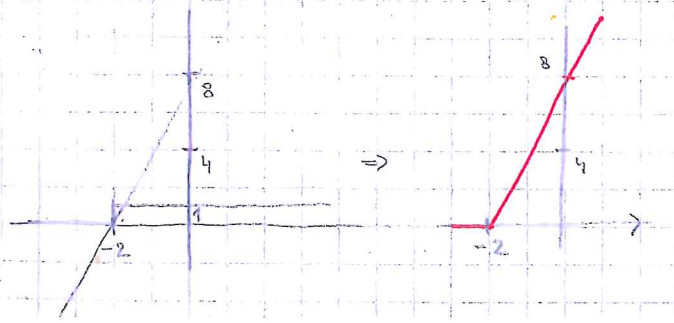
1.4 Given: $x(t) = \underbrace{4(t+2)u(t+2)}_{1} \underbrace{- 4tu(t)}_{2} \underbrace{- 4u(t-2)}_{3} \underbrace{- 4(t-4)u(t-4)}_{4} + \underbrace{4(t-5)u(t-5)}_{5}$

find and sketch

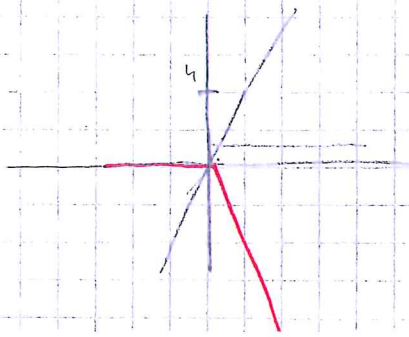
$$y(t) = x(2t-4)$$

① $4(t+2)u(t+2)$

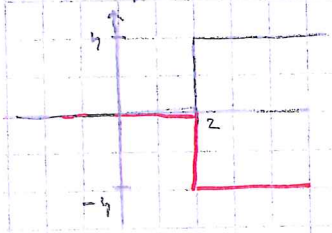
$u(t+2) = \begin{cases} 1 & t+2 \geq 0 \Rightarrow t \geq -2 \\ 0 & t < -2 \end{cases}$



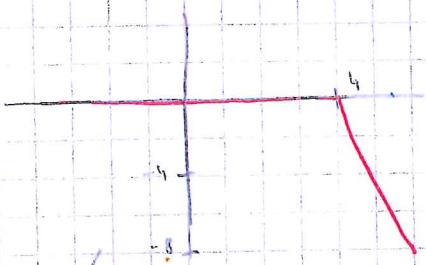
② $-4tu(t)$



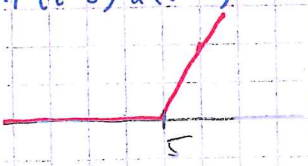
$-4u(t-2)$ $\quad t-2 \geq 0 \Rightarrow t \geq 2$

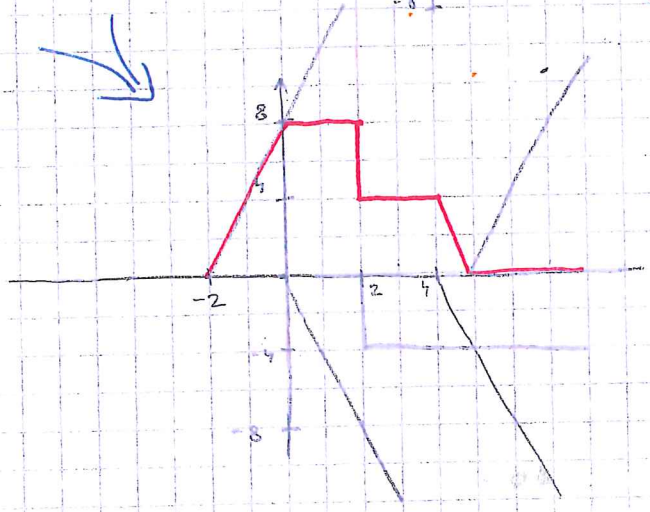


④ $-4(t-4)u(t-4)$

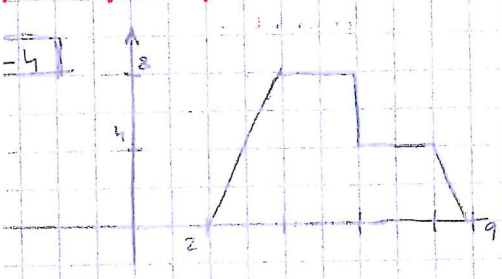


$4(t-5)u(t-5)$

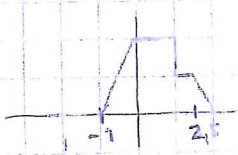


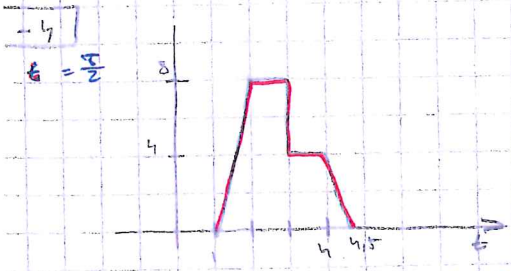


$) - x(2t-4)$

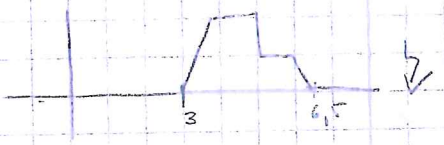


OR: $\quad 2t-4$





$2t-4$



$y(t=1) = x(2 \cdot 1 - 4) = x(-2)$

$\downarrow 0 \qquad\qquad\qquad\quad \downarrow 0$

$y(4) = x(8-4) = x(4)$

$\downarrow 4 \qquad\qquad\quad \downarrow 4$