$$x(t) = u(-2t+3)$$

* Define a new variable $y(t) = u(t+3)$

$u(t)$

$y(t) = u(t+3)$

-3   0
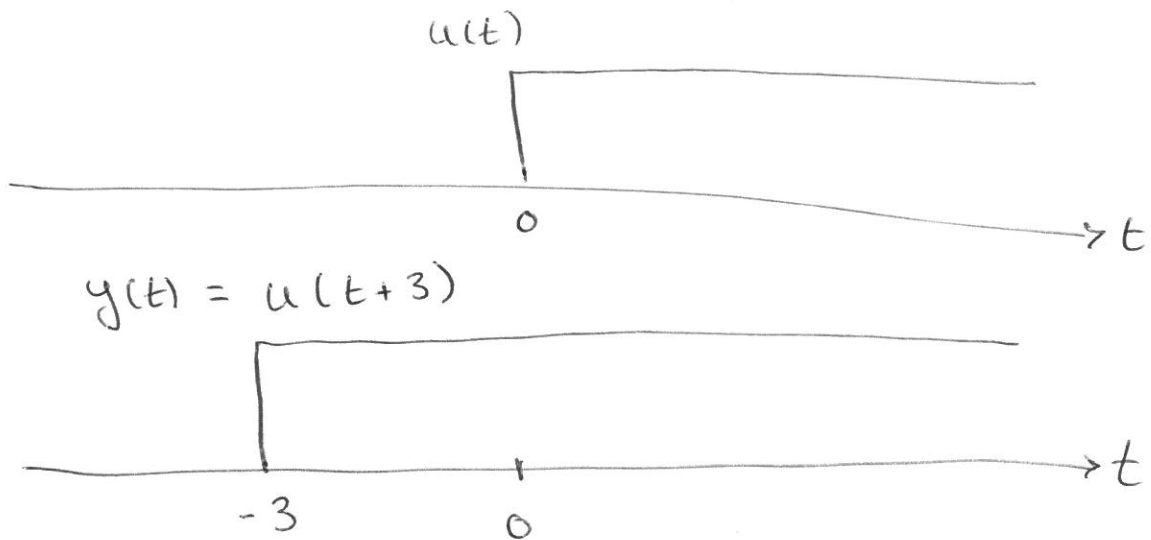
* Then define another variable $z(t) = y(-2t)$
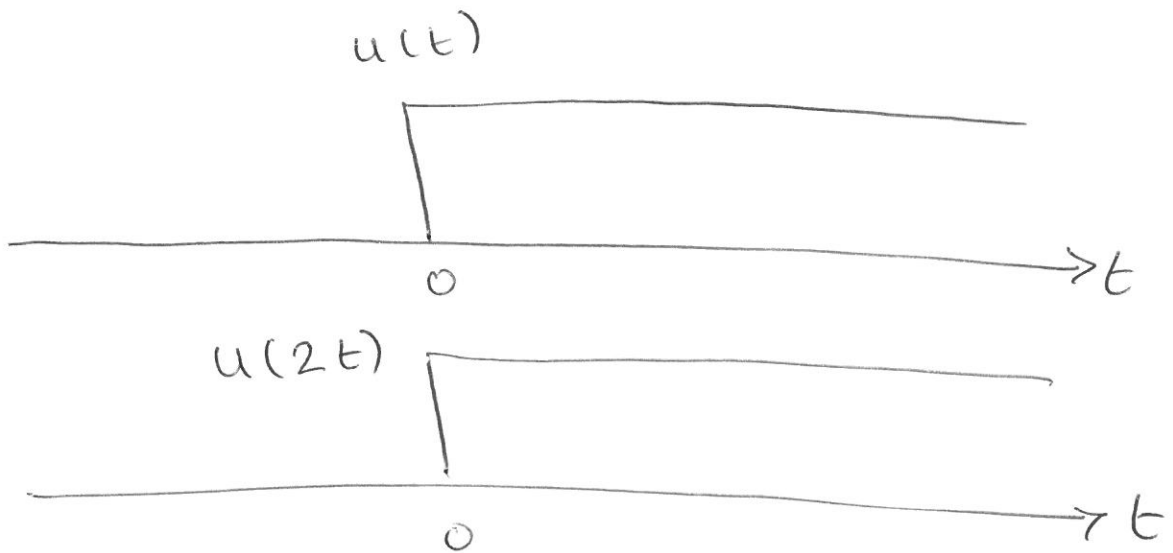
$$z(t) = y(-2t) = u(-2t+3)$$
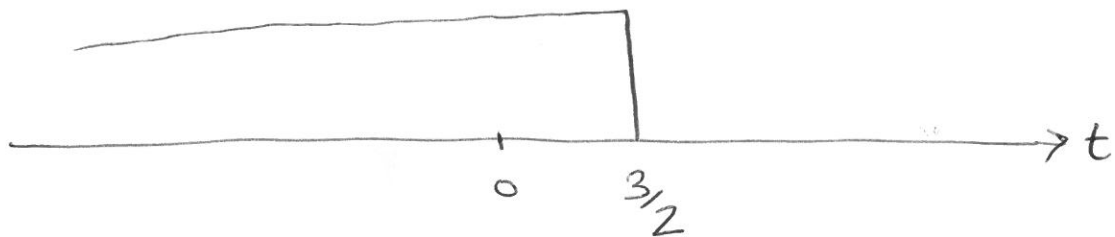
0     $\frac{3}{2}$

$$x(t) = u(-2t + 3)$$

✳ rewrite as $x(t) = u(-2(t - \frac{3}{2}))$

✳ Compress by 2

$u(t)$

$u(2t)$

✳ Time reverse

$u(-2t)$
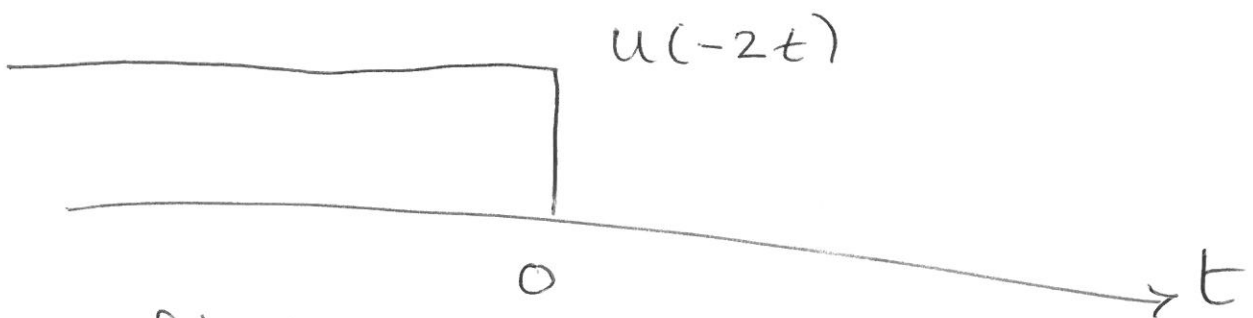
✳ Shift by $\frac{3}{2}$ to the right hand side

$u(-2(t - \frac{3}{2}))$

$x(t)$
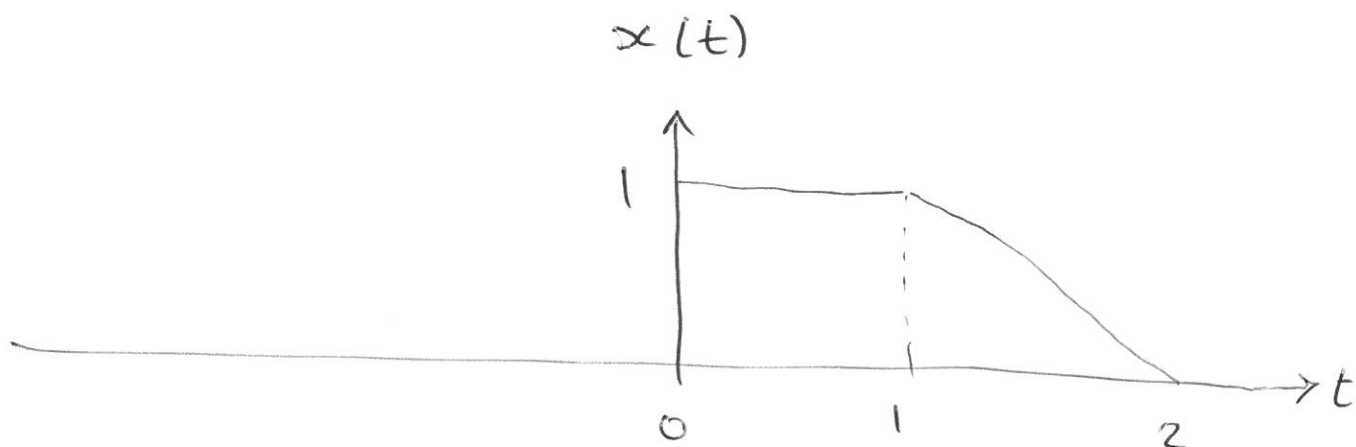
Find $x(-t+1)$ Method 1

* Define a new variable $y(t) = x(t+1)$

* Then define another variable $z(t) = y(-t)$
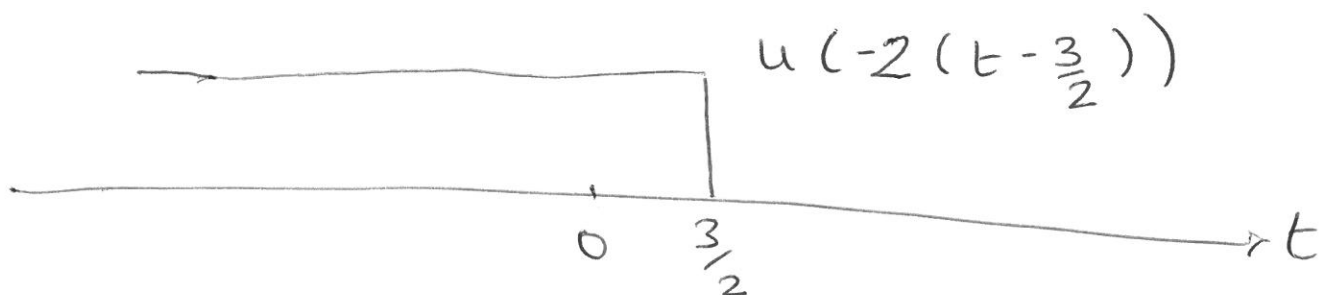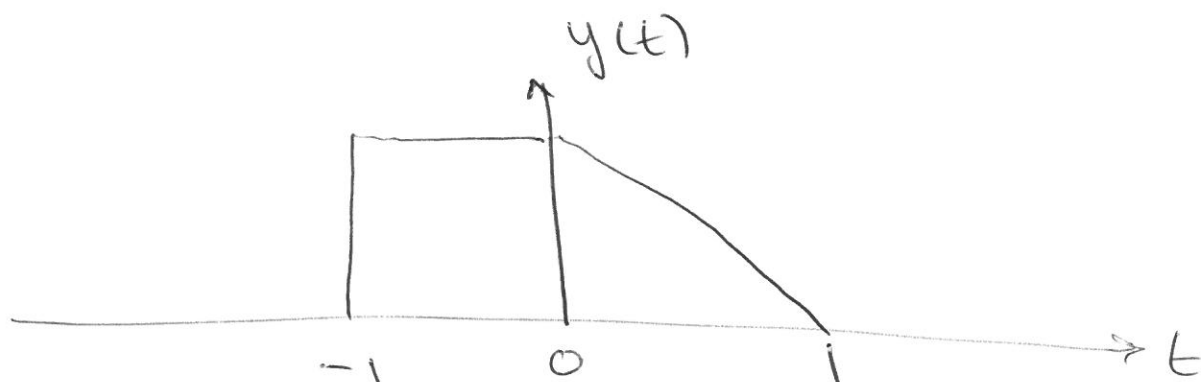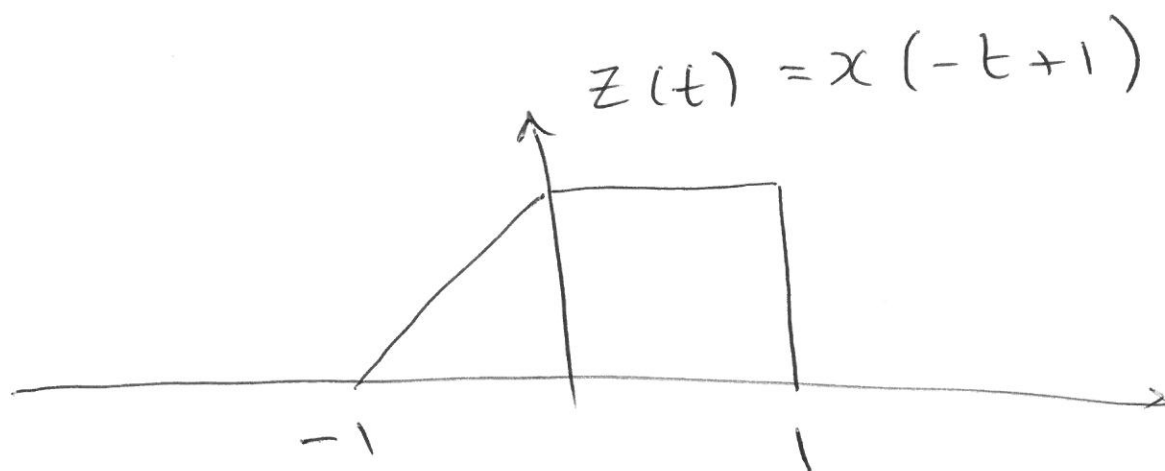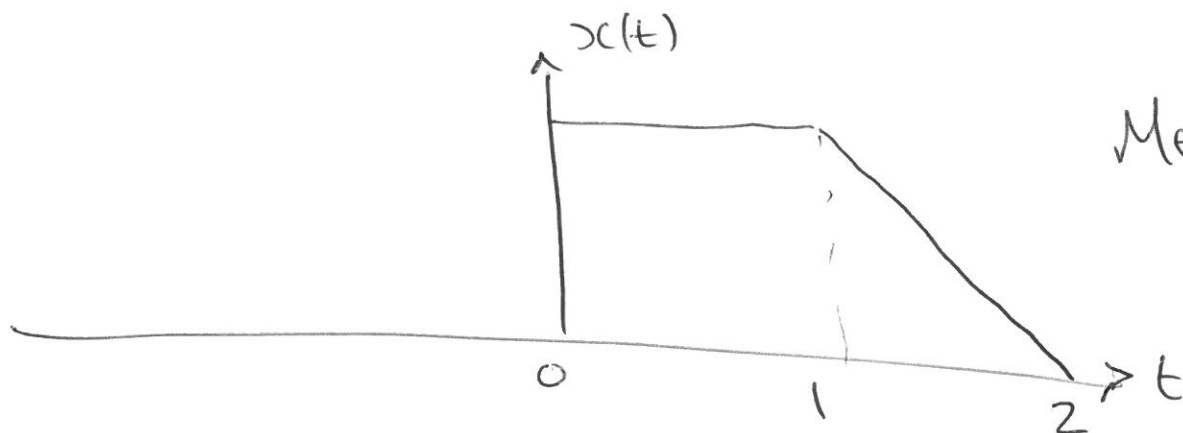
$$z(t) = x(-t+1)$$
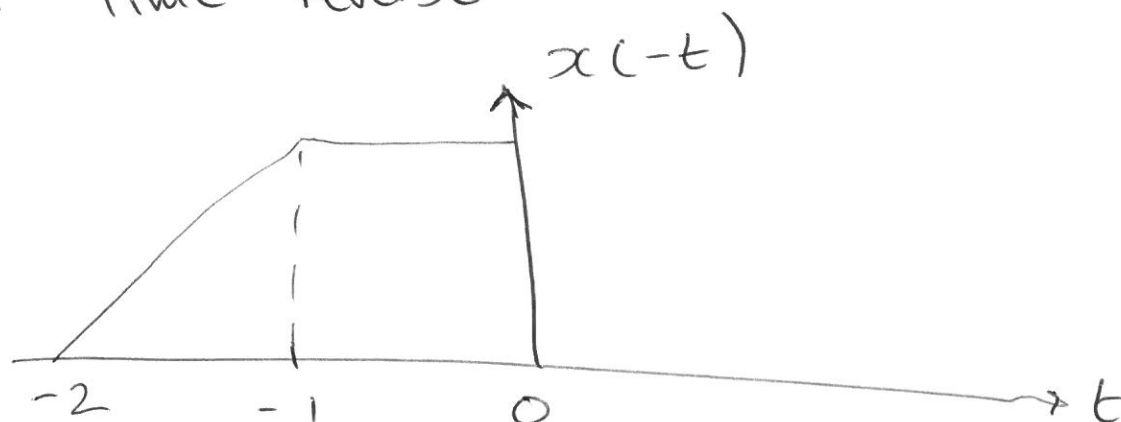
$x(t)$

Method 2

Find $x(-t+1)$

* Rewrite as $x(-(t-1))$

* Time reverse

$x(-t)$

* Shift by 1 to the right hand side

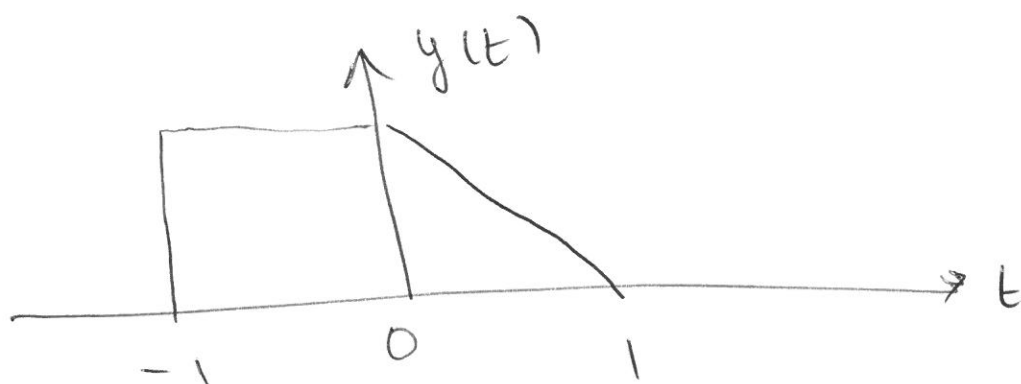$x(-(t-1))$

$x(t)$
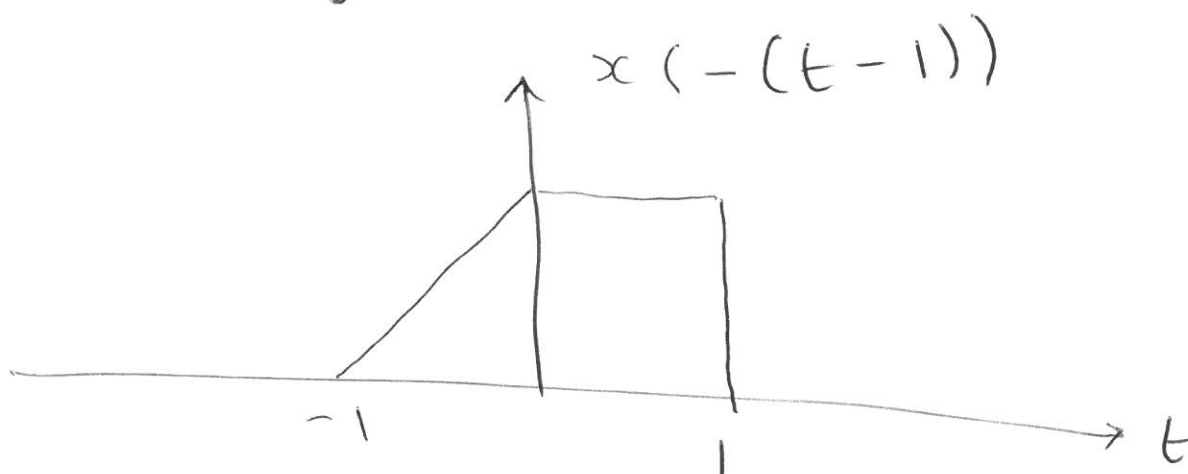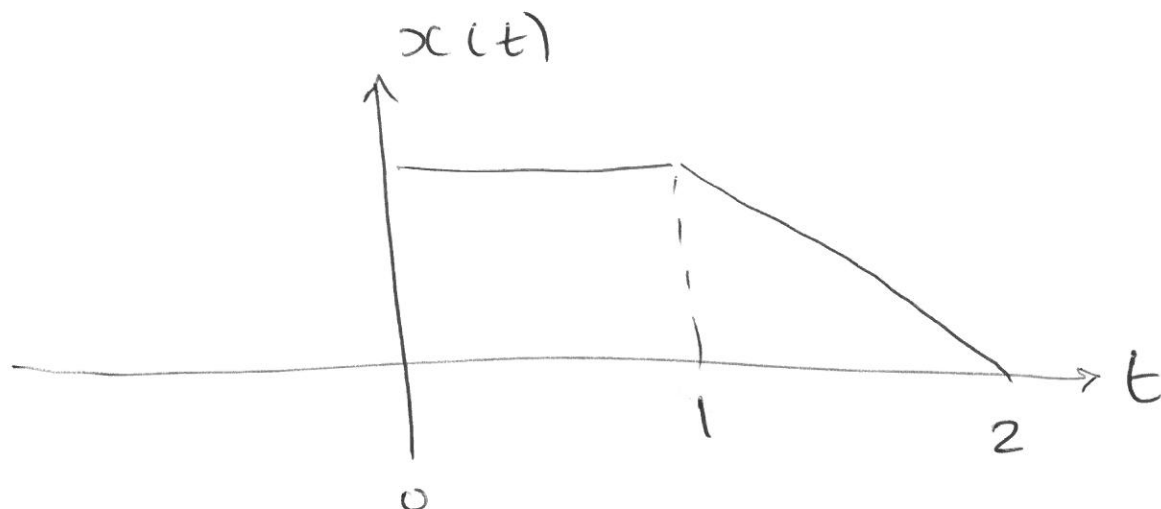
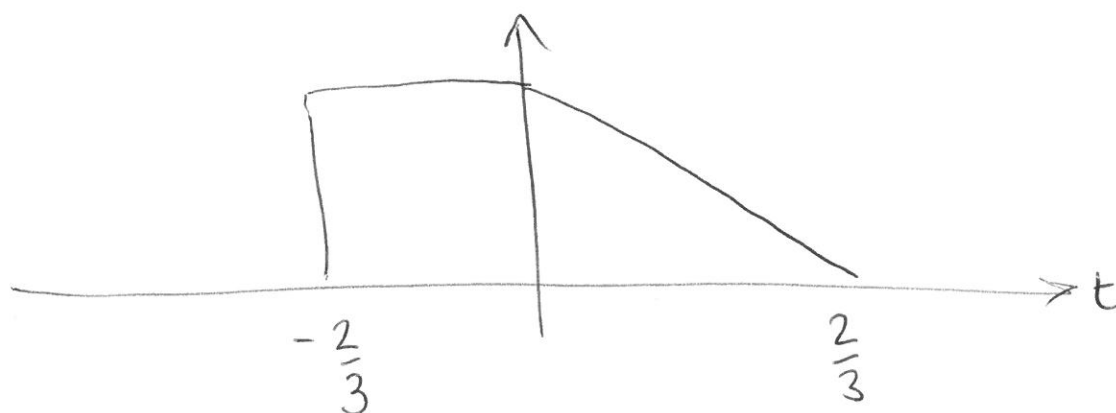

Find $x\left(\frac{3}{2}t+1\right)$ <u>Method 1</u>
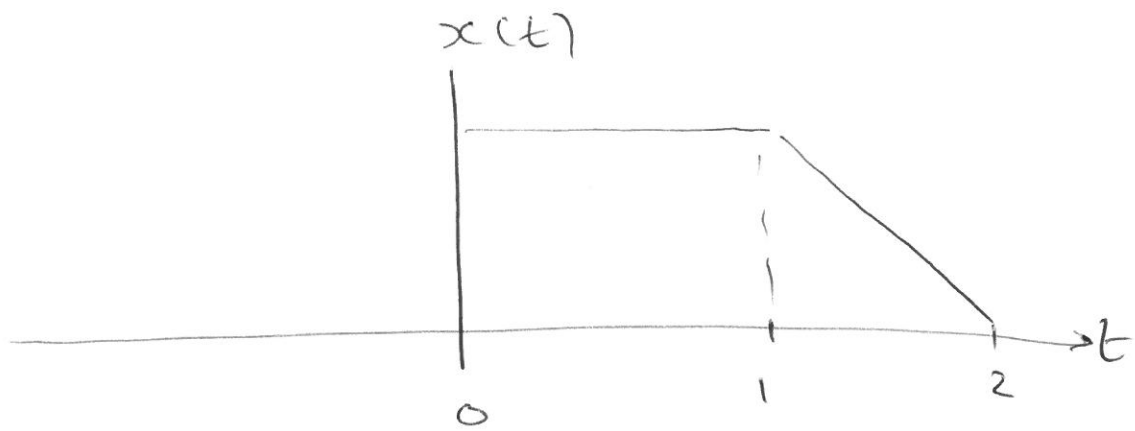
* Define a new variable $y(t) = x(t+1)$

$y(t)$

* Then define another variable $z(t) = y\left(\frac{3}{2}t\right)$

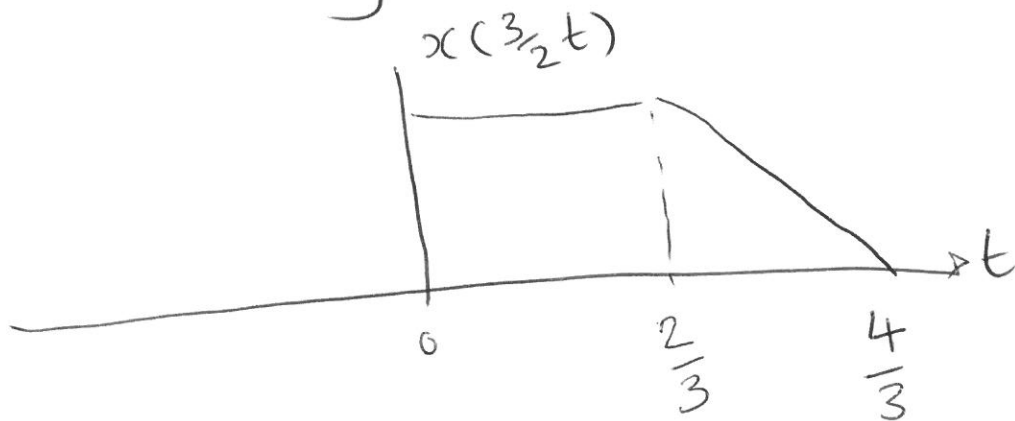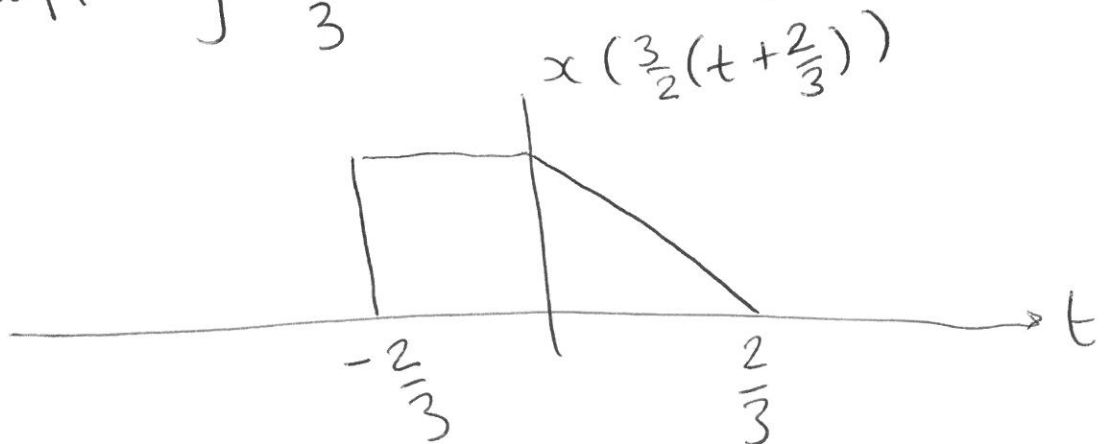$z(t) = x\left(\frac{3}{2}t+1\right)$

x(t)

Find $x\left(\dfrac{3}{2}t+1\right)$ Method 2

✱ Rewrite as $x\left(\dfrac{3}{2}\left(t+\dfrac{2}{3}\right)\right)$

✱ Time scaling by $\dfrac{3}{2}$

$x\left(\dfrac{3}{2}t\right)$

✱ Shift by $\dfrac{2}{3}$ to the left hand side

$x\left(\dfrac{3}{2}\left(t+\dfrac{2}{3}\right)\right)$

1.2

0.8

0.4

0.6

$$k$$

-9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9
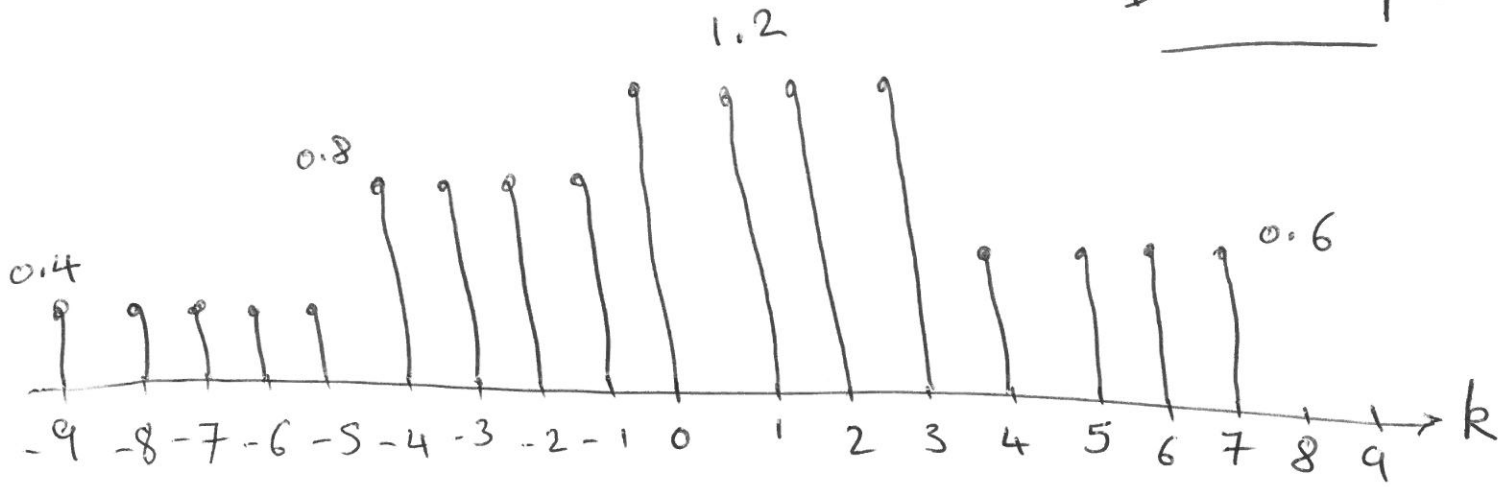
Find $x[-15-3k]$

Method 2

* Rewrite as $x[-3(k+5)]$

* Compress by 3 $x[3k]$

1.2

0.8

0.6

0.4

-3 -2 -1 0 1 2 k

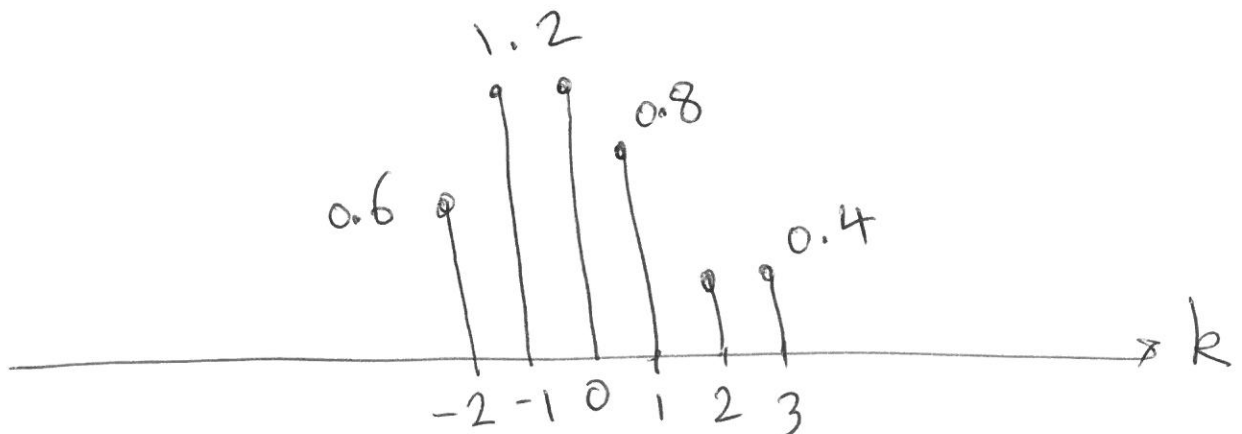* Time reverse $x[-3k]$

1.2

0.8

0.6

0.4
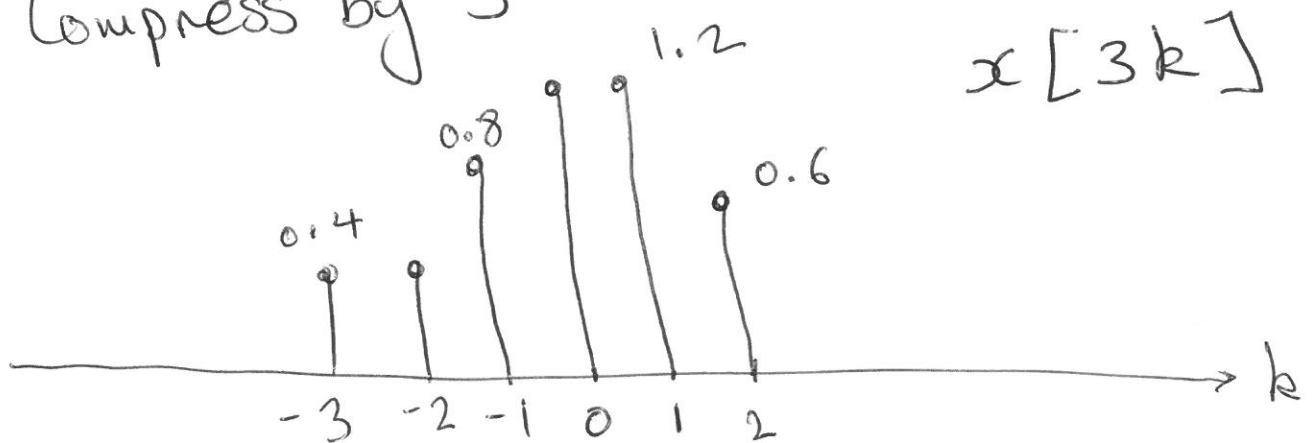
-2 -1 0 1 2 3 k

* Then shift by 5 samples to the

left hand side

$$x[-3(k+5)]$$
$$= x[-15-3k]$$