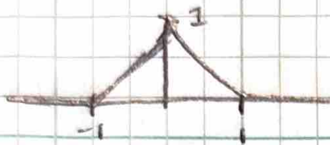
Seth Ricks

ECEN 380
1/10/2026

PS01: 1.42(c), 1.50, 1.52(f), 1.56(f), 1.57(c), 1.60, MATLAB 1.93

1.42 C Determine whether the following signals are periodic. If they are, find the fundamental period.

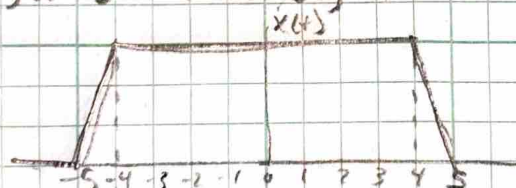
c.) $x(t) = \sum_{k=-\infty}^{\infty} w(t-3k)$ For $w(t)$ below



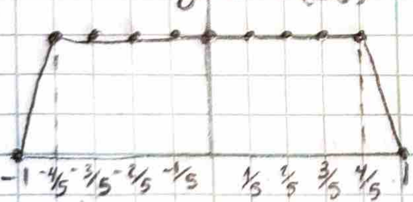
periodic signal: $x(t) = x(t+T)$

$\boxed{\text{Periodic, fundamental frequency } = \frac{1}{3}}$

1.50 The trapezoidal pulse $x(t)$ of figure below is time scaled, producing the equation $y(t) = x(at)$. Sketch $y(t)$ for a.) $a=5$ and b.) $a=0.2$

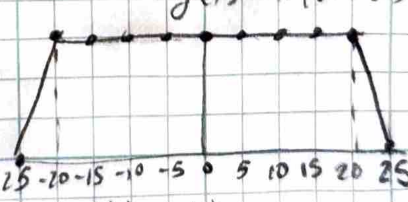


$y(t) = x(5t)$



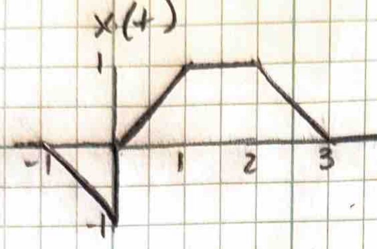
$y(0) = x(0)$
$y(1) = x(5)$
$y(-1) = x(-5)$
$y(4/5) = x(4)$
$y(2/5) = x(2)$

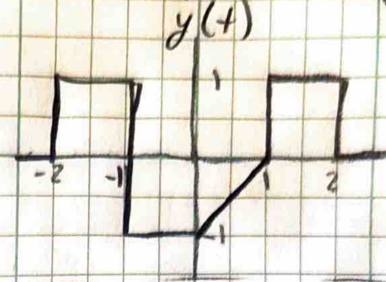
$y(t) = x(0.2t)$



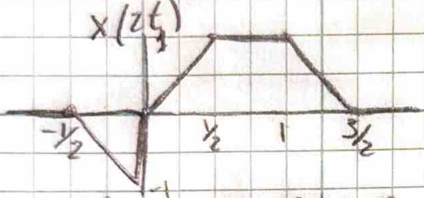
$y(0) = x(0)$
$y(25) = x(5)$
$y(20) = x(4)$

(1.52 f) Let $x(t)$ and $y(t)$ be given in figure P1.52(a) and (b). Sketch the following.



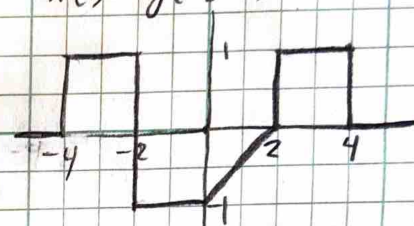


f.) $x(2t)\,y(\frac{1}{2}t+1)$



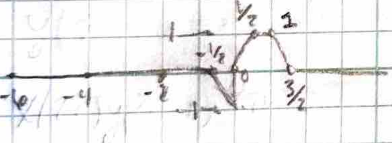
* divide x-axis points by 2

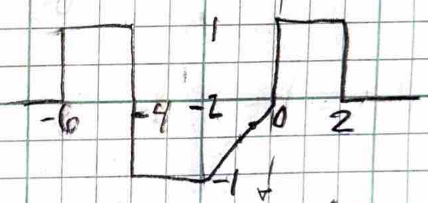
$w(t) = y(\frac{1}{2}t)$



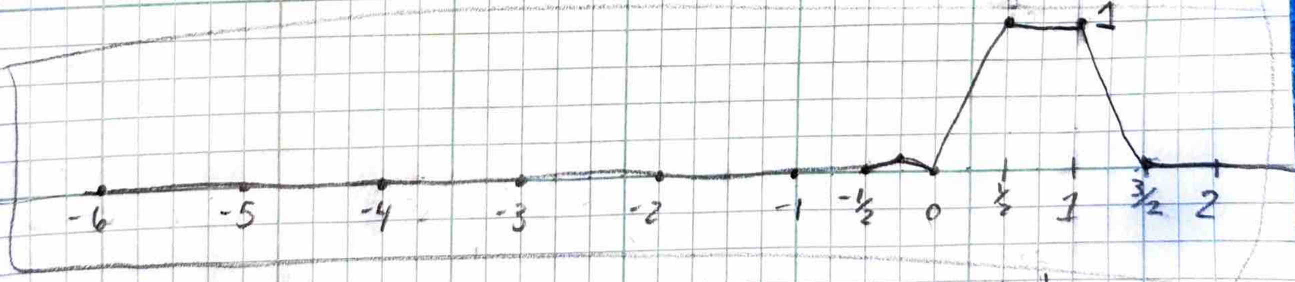
* Mult. x-axis points by 2

$y(\frac{1}{2}t+1) = w(t+2) = y(\frac{1}{2}(t+2))$





* -2 each x-axis point



$f(0) = x(0)\,y(1) = 0(0)$
$= -1(0)(0)$

$f(\frac{1}{2}) = x(1)\,y(1\frac{1}{4}) = 1$

$f(1) = x(2)\,y(\frac{3}{2}) = (1)(1) = 1$

$f(\frac{3}{2}) = x(3)\,y(\frac{3}{4}+1) = 0$

$y = mx + b$

$0 = (-2)(-\frac{1}{2}) + b$

$0 = 1 + b$

$b = -1$

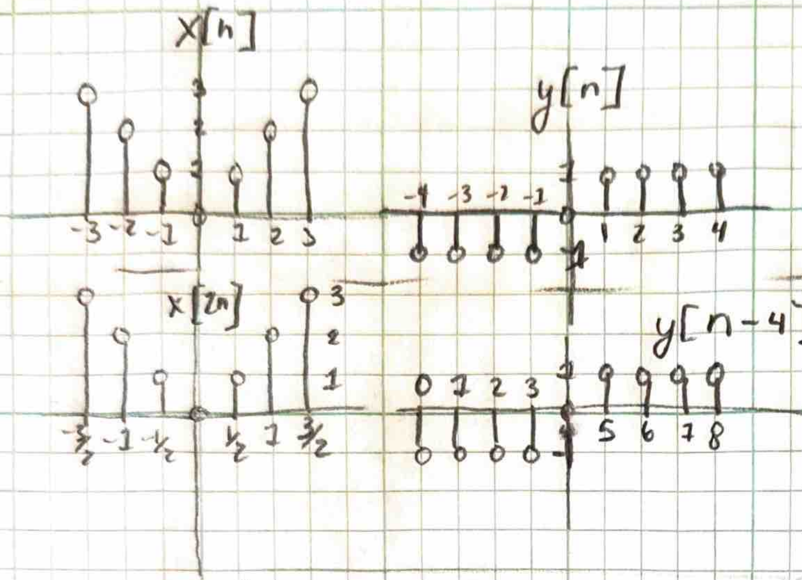
$y_1 = -2x - 1$

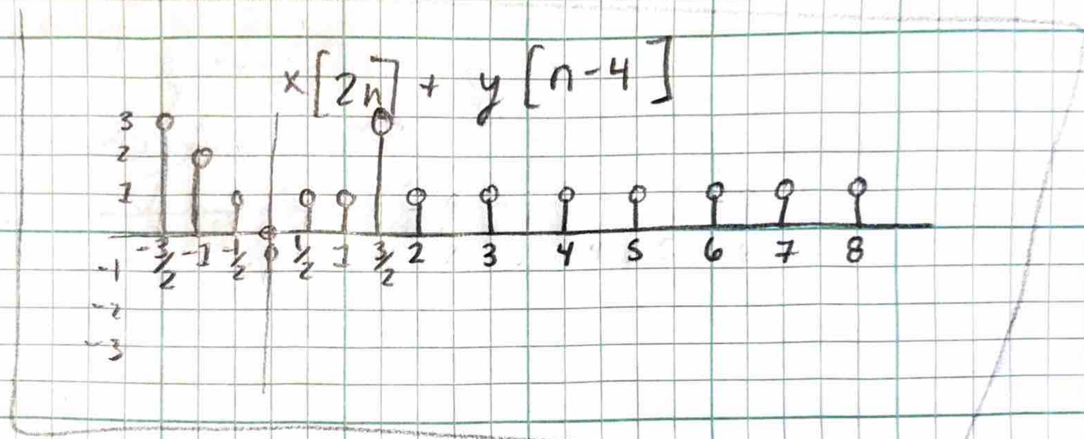
$y_2 = \frac{1}{2}x$

$y = y_1 y_2 = (-2x-1)(\frac{1}{2}x)$

$y = -x^2 - \frac{x}{2} \Rightarrow y(-\frac{1}{4}) = -(-\frac{1}{4})^2 - \frac{(-\frac{1}{4})}{2}$

1.56f Sketch $x[2n] + y[n-4]$





1.57c Determine if periodic, if it is find the fundamental period.

c.) $x(t) = \cos(2t) + \sin(3t)$

$\cos(x+2\pi) = \cos x$ and $\sin(x+2\pi) = \sin x$

$\boxed{\text{periodic, fundamental frequency} = 2\pi}$

1.60 Consider the complex-valued exponential signal $x(t) = Ae^{\alpha t + j\omega t}$, $\alpha > 0$
Evaluate real and imaginary components of $x(t)$.

$$x(t) = Ae^{\alpha t + j\omega t} = A\left[e^{\alpha t} * e^{j\omega t}\right]$$

$$x(t) = A\left[e^{\alpha t} * \left(\cos(\omega t) + j\sin(\omega t)\right)\right]$$

$$x(t) = Ae^{\alpha t}\cos(\omega t) + jAe^{\alpha t}\sin(\omega t)$$

Real: $Ae^{\alpha t}\cos\omega t$
Imaginary: $Ae^{\alpha t}\sin\omega t$

Editor - C:\Users\sethr\OneDrive\Desktop\ECEN380\Homework\Homework 1\homework

homework1.m | MATLAB_review.m

```matlab
% x(t) = 10e^(-t) - 5e^(-0.5t)
% plot x(t) versus t for t = 0:0.01:5
t = 0:0.01:5;
x = 10 * exp(-t) - 5 * exp(-0.5 * t);
plot(t,x);
grid on;
title('Seth Ricks');
xlabel('t');
ylabel('X(t)');
```