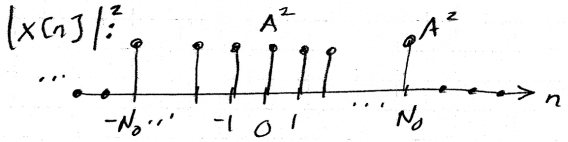
(1.) $g[n] = 3\cos\left(2\pi n \frac{1}{3}\right) - \sin\left(2\pi n \frac{2}{7}\right)$

$T_1 = 3$ $\quad$ $T_2 = 7$

$T_0 = \text{LCM}(3,7) = \boxed{21}$

(2) Text, 3-15a.

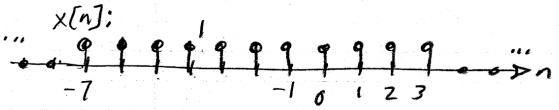
$x[n] = A\,\text{rect}_{N_0}[n]$

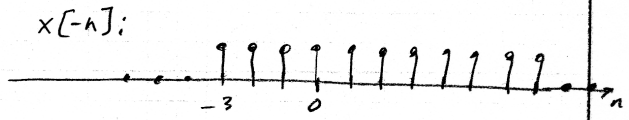


$$E_x = \sum_{n=-\infty}^{\infty} |x[n]|^2 = (2N_0+1)A^2$$

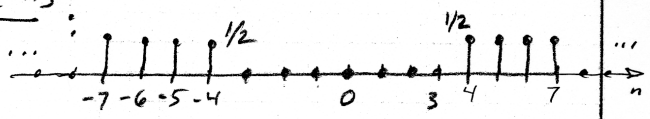
(3) Text, 3-33a

$x[n] = \text{rect}_5[n+2]$

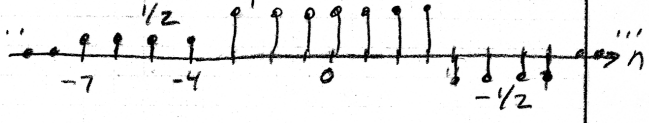




$$x_e[n] = \frac{x[n] + x[-n]}{2}$$



$x_o[n] = x[n] - x_e[n]$



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(4) 3-34 e

Appendix A, p. 719

$\sin x \cos y = \frac{1}{2}\sin(x-y) + \frac{1}{2}\sin(x+y)$

$$g[n] = -3\cos\left(2\pi\frac{n}{7}\right)\sin\left(2\pi\frac{n}{6}\right)$$

$$= -\frac{3}{2}\sin\left(\frac{2\pi n}{6} - \frac{2\pi n}{7}\right) - \frac{3}{2}\sin\left(\frac{2\pi n}{6} + \frac{2\pi n}{7}\right)$$

$$= -\frac{3}{2}\sin\left(2\pi\left(\frac{1}{6}-\frac{1}{7}\right)n\right) - \frac{3}{2}\sin\left(2\pi\left(\frac{1}{6}+\frac{1}{7}\right)n\right)$$

$$= -\frac{3}{2}\sin\left(2\pi\frac{1}{42}n\right) - \frac{3}{2}\sin\left(2\pi\frac{13}{42}n\right)$$

$N_0 = 42$ $\quad$ $N_0 = 42$

$\boxed{N_0 = 42.}$

(5) Text, 3-35d

$$x[n] = \left(-\frac{1}{3}\right)^n u[n]$$

$$E_x = \sum_{n=-\infty}^{\infty} |x[n]|^2 = \sum_{n=0}^{\infty}\left(\frac{1}{9}\right)^n = \frac{1}{1-\frac{1}{9}} = \boxed{\frac{9}{8}}$$

(6) Text, 3-36e

$$x[n] = e^{-j\frac{\pi n}{2}} = j^n$$

n	-2	-1	0	1	2	3	4	5	
$x[n]$	-1	$-j$	1	j	-1	$-j$	1	j	...
$\lvert x[n]\rvert^2$	1	1	1	1	1	1	1	1	

} periodic, $N_0 = 4$

1 period

$$P_x = \frac{1}{N_0}\sum_{1\,\text{period}} |x[n]|^2 = \frac{1+1+1+1}{4} = \boxed{1}$$

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