1.20

1.20 (a) Given

$$X(t)=e^{2jt} \longrightarrow y(t)=e^{j3t}$$

$$X(t)=e^{-2jt} \longrightarrow y(t)=e^{-j3t}$$

Since the system liner

$$x_1(t)=1/2(e^{j2t}+e^{-2jt}) \longrightarrow y_1(t)=1/2(e^{j3t}+e^{-j3t})$$

Therefore

$$x_1(t)=\cos(2t) \longrightarrow y_1(t)=\cos(3t)$$

(b) we know that

$$x_2(t)=\cos(2(t-1/2))=(e^{-j}e^{2jt}+e^{j}e^{-2jt})/2$$

Using the linearity property, we may once again write

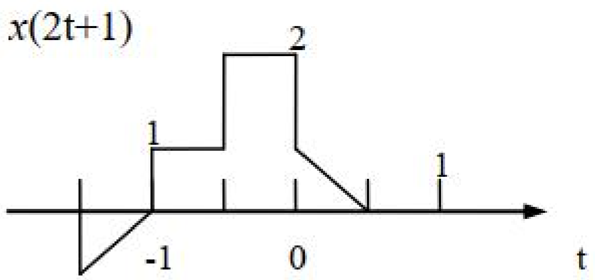
$$x_1(t)=\frac{1}{2}(e^{-j}e^{2jt}+e^{j}e^{-2jt}) \longrightarrow y_1(t)=(e^{-j}e^{3jt}+e^{j}e^{-3jt})=\cos(3t-1)$$

Therefore,

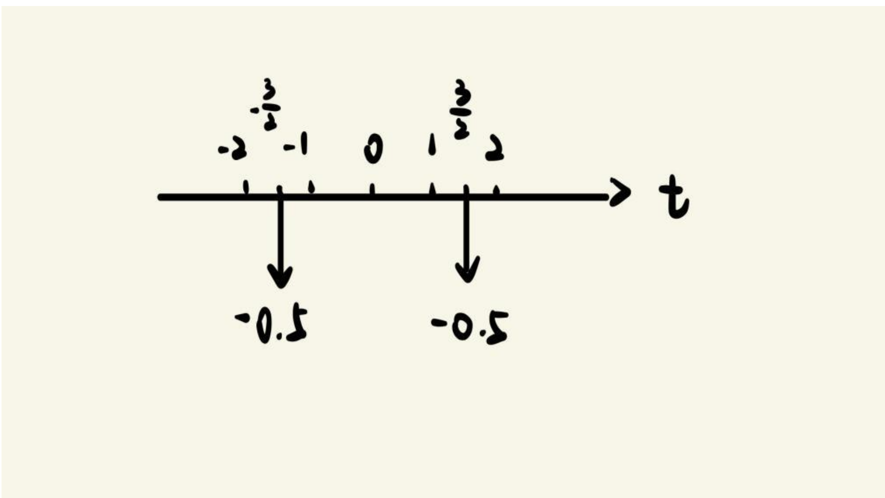
$$x_1(t)=\cos(2(t-1/2)) \longrightarrow y_1(t)=\cos(3t-1)$$

1.21(c)(f)

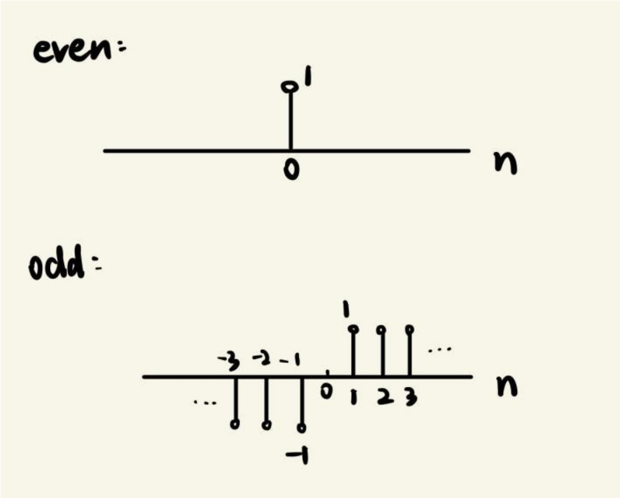
(c)



(f)



1.24(a)



1.26

(a) periodic, period=7.
(b) Not period.
(c) periodic, period=8.
(d) $x[n]=(1/2)[\cos(3\pi n/4+\cos(\pi n/4))$. periodic, period=8.
(e) periodic, period=16.

1.27(a)(f)

(a) Linear, stable

(f) Linear, stable

1.41

(a) $y[n]=2x[n]$.Therefore, the system is time invariant.
(b) $y[n]=(2n-1)x[n]$.This is not time-invariant because $y[n-N_0]\neq(2n-1)2x[n-N_0]$.
(c) $y[n]=x[n]\{1+(-1)^n+1+(-1)^{n-1}\}=2x[n]$.Therefore, the system is time invariant .