Quiz 4
( 7 )

1. a) $\sum_{n=60}^{T 4} x[n]$

$$
\begin{aligned}
a_{k}=\sum_{\langle N\rangle} x[n] e^{j k \omega_{0} n} \Rightarrow a_{0}=N \sum_{\langle N\rangle} x[n]=15 \sum_{n=60}^{74} x[n] & =2.15 \\
& =30
\end{aligned}
$$

b). Average power of the signal.

$$
\frac{1}{N} \sum_{\langle N\rangle}|x[n]|^{2}=\sum_{\langle N\rangle}\left|a_{k}\right|^{2}=48
$$

c) $x[90]$.

$$
\begin{aligned}
x[n] & =\sum_{k=\langle N\rangle} a_{k} e^{j k \omega_{0} n} \\
x[90] & =x[0]=\sum_{\langle N\rangle} a_{k}=10
\end{aligned}
$$

d).

$$
\begin{aligned}
& x[91]=x[1]=\sum_{k=\langle N\rangle} a_{k} e^{j k \frac{2 \pi}{15}} \\
& =2+\sum_{k=1}^{6}(-1) e^{j \frac{2 \pi}{15} k}+\sum_{k=1}^{12} e^{j \frac{2 \pi}{15} k}+4 \sum_{k=13}^{\sum_{k}^{14}} e^{j \frac{2 \pi}{15} k .}
\end{aligned}
$$

e) $x[n+1] \Rightarrow b_{k}=a_{k} e^{\frac{j 2 \pi}{15}}$
2. $h[n]=\left(\frac{1}{4}\right)^{n} u[n] . \quad x[n]=\cos \left(\frac{3 \pi n}{10}\right) \sim \omega_{0}=\frac{3 \pi}{10} \quad a_{1}=i_{2}, a_{-1}=1 / 2$

$$
\begin{aligned}
& y[n]=\sum_{k=-\infty}^{\infty} a_{k} H\left(e^{j k \omega_{0}}\right) e^{j k \omega_{0} n} . \\
& H\left(e^{j \omega}\right)=\frac{1}{1-\frac{1}{4} e^{-j \omega}} .
\end{aligned}
$$

For $y[m]$

$$
\omega_{0}=\frac{3 \pi}{10} \left\lvert\, \begin{aligned}
& \phi_{1}=\frac{1}{2} \cdot \frac{1}{1-1 / 4 e^{-j} \frac{3 \pi}{10}} \\
& \phi_{4}=\frac{1}{2} \cdot \frac{1}{1-1,+j 3 \pi}
\end{aligned}\right.
$$

