Ex01

ゆきちゃん

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- Let $x(t)$ be the complex exponential signal $x(\tau) = e^{j\omega_0 t}$ with radian frequency ω_0 and fundamental period $T_0 = \dfrac{2\pi}{\omega_0}$.
- Consider the discrete-time signal $x[n]$ obtained by uniform sampling of $x(t)$ with sampling interval T_s. That is, $x[n] = x(nT_s) = e^{j\omega_0 nT_s}$.
- Find the condition on the value of T_s, so that $x[n]$ is preiodic.

answer:(maybe)
$x[n] = x[n + mT_0]$ となればいいはず？なので、

$$
\begin{aligned}
x[n + mT_0] &= x((n + mT_0)T_s) && \text{(0-1)}\\
&= e^{j\omega_0 (n+mT_0)T_s} && \text{(0-2)}\\
&= e^{j\omega_0 nT_s} e^{j\omega_0 mT_0 T_s} && \text{(0-3)}\\
&= e^{j\omega_0 nT_s} && \text{(0-4)}\\
&= x[n] && \text{(0-5)}
\end{aligned}
$$

つまり、

$$e^{j\omega_0 mT_0 T_s} = 1 = e^{j2\pi k} \tag{0-6}$$

よって、

$$\omega_0 mT_0 T_s = 2\pi k \tag{0-7}$$

したがって

$$T_s = \frac{2\pi k}{\omega_0 mT_0} \tag{0-8}$$

ただし、m, k は整数
多分...