

2024sep11

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$$X_k = \frac{1}{T_0} \int_0^{T_0} x(t) e^{-j \frac{2\pi k t}{T_0}} dt$$

$$T_0 = 1$$

$$x(t) = \begin{cases} 3, 0 & 0.55 \leq t \leq 0.76, \\ 0 & \text{else} \end{cases}$$

$$X_k = \int_0^1 x(t) e^{-j 2\pi k t} dt$$
$$= \int_{0.55}^{0.76} 3 e^{-j 2\pi k t} dt$$

$$\int_{0.55}^{0.76} \dots$$

$$X_0 = \int_{0.55}^{0.76} 3 dt$$
$$= 3 \cdot 0.21 = 0.63$$

$$X_k = \frac{3}{-j 2\pi k} \left[e^{-j 2\pi k t} \right]_{0.55}^{0.76}$$

$$= \frac{3}{-j 2\pi k} \left(e^{-j 2\pi k \cdot 0.76} - e^{-j 2\pi k \cdot 0.55} \right)$$