26. Using the CTFS table of transforms and the CTFS properties, find the CTFS harmonic function of each of these periodic signals using the representation time T_F indicated.

(a) $x(t) = 3\text{rect}(2(t-1/4)) * \delta_1(t)$, $T_F = 1$

Remember:

If $g(t) = g_0(t) * \delta(t)$

Then $g(t-t_0) = g_0(t-t_0) * \delta(t) = g_0(t) * \delta(t-t_0)$

And $g(t-t_0) \neq g_0(t-t_0) * \delta(t-t_0) = g(t-2t_0)$

(b) $x(t) = 5[\text{tri}(t-1)-\text{tri}(t+1)] * \delta_4(t)$, $T_F = 4$

(c) $x(t) = 3\sin(6\pi t) + 4\cos(8\pi t)$, $T_F = 1$

(d) $x(t) = 2\cos(24\pi t) - 8\cos(30\pi t) + 6\sin(36\pi t)$, $T_F = 2$

(e) $x(t) = \int_{-\infty}^{t} [\delta_1(\lambda) - \delta_1(\lambda - 1/2)] d\lambda$, $T_F = 1$

(f) $x(t) = 4\cos(100\pi t)\sin(1000\pi t)$, $T_F = 1/50$

28. Identify which of these functions has a complex CTFS $G[k]$ for which

1. $\text{Re}(G[k]) = 0$ for all k,
2. $\text{Im}(G[k]) = 0$ for all k,

or

3. neither of these conditions applies.

(a) $g(t) = 18\cos(200\pi t) + 22\cos(240\pi t)$

(b) $g(t) = -4\sin(10\pi t)\sin(2000\pi t)$

(c) $g(t) = \text{tri}((t-1)/4) * \delta_{10}(t)$

31. In figure E.31 is a graph of one fundamental period of a periodic function $x(t)$. A CTFS harmonic function $X[k]$ is found based on the representation time T_F being the same as the fundamental period $T_0 (T_F = T_0)$.

(a) If $A_1 = 4, A_2 = -3$ and $T_0 = 5$, what is the numerical value of $X[0]$?

(b) If the representation time is changed to $T_F = 3T_0$, what is the new numerical value of $X[0]$?

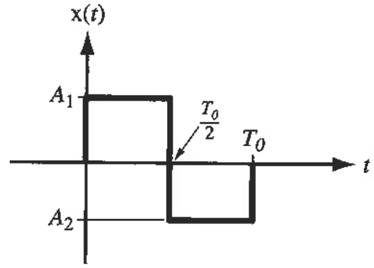

Figure E.31