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

Remember:
If \( g(t) = g_0(t) \ast \delta(t) \)
Then \( g(t-t_0) = g_0(t-t_0) \ast \delta(t) = g_0(t) \ast \delta(t-t_0) \)
And \( g(t-t_0) \neq g_0(t-t_0) \ast \delta(t-t_0) = g(t-2t_0) \)

(b) \( x(t) = 5[\text{tri}(t-1)-\text{tri}(t+1)] \ast \delta_4(t), T_F = 4 \)
(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) \( g(t) = \text{tri}(t-1/4) \ast \delta_{10}(t) \)

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 \( X[0] \)?

\[ x(t) \]
\[ A_1 \]
\[ T_0/2 \]
\[ T_0 \]
\[ A_2 \]

\[ \text{Figure E.31} \]