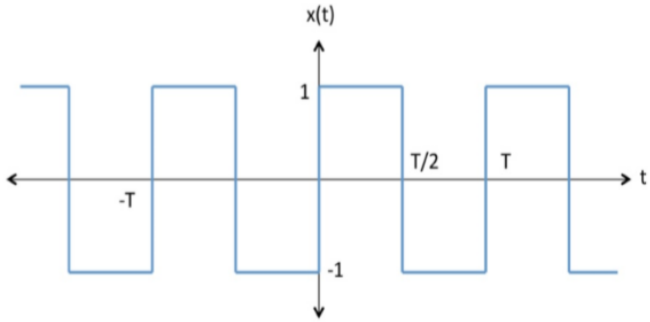

$$x_0(t)=2P_{T/2}(t-T/4)-1$$

$$x(t)=\frac{1}{2}a_0+\sum_{k=1}^{\infty}\left[a_k\cos\left(k\frac{2\pi}{T}t\right)+b_k\sin\left(k\frac{2\pi}{T}t\right)\right]$$

$$a_k=\frac{2}{T}\int_0^T\left[x(t)\cos\left(k\frac{2\pi}{T}t\right)dt\right]$$

$$b_k=\frac{2}{T}\int_0^T\left[x(t)\sin\left(k\frac{2\pi}{T}t\right)dt\right]$$

$$a_0=\frac{2}{T}\int_0^T[x(t)dt]$$

finding a_0

$$a_0=\frac{2}{T}\int_0^T[x(t)dt]$$

$$a_0=\frac{2}{T}(0)$$

$$a_0=0$$

finding a_k

$$a_k=\frac{2}{T}\int_0^T\left[(2P_{T/2}(t-T/4)-1)\cos\left(k\frac{2\pi}{T}t\right)dt\right]$$

$$a_k=\frac{2}{T}\int_0^T\left[2P_{T/2}(t-T/4)\cos\left(k\frac{2\pi}{T}t\right)dt\right]-\frac{2}{T}\int_0^T\left[\cos\left(k\frac{2\pi}{T}t\right)dt\right]$$

$$a_k=\frac{2}{T}\int_0^T\left[2u(t)\cos\left(k\frac{2\pi}{T}t\right)dt\right]-\frac{2}{T}\int_0^T\left[2u\left(t-\frac{t}{2}\right)\cos\left(k\frac{2\pi}{T}t\right)dt\right]-\frac{2}{T}\int_0^T\left[\cos\left(k\frac{2\pi}{T}t\right)dt\right]$$

$$a_k = \frac{2}{T}\int_0^T \left[2\cos\left(k\frac{2\pi}{T}t\right)dt\right] - \frac{2}{T}\int_0^T \left[2u\left(t-\frac{t}{2}\right)\cos\left(k\frac{2\pi}{T}t\right)dt\right] - \frac{2}{T}\int_0^T \left[\cos\left(k\frac{2\pi}{T}t\right)dt\right]$$

$$a_k = \frac{2}{T}\int_0^T \left[2\cos\left(k\frac{2\pi}{T}t\right)dt\right] - \frac{2}{T}\int_{T/2}^T \left[2\cos\left(k\frac{2\pi}{T}t\right)dt\right] - \frac{2}{T}\int_0^T \left[\cos\left(k\frac{2\pi}{T}t\right)dt\right]$$

$$a_k = \frac{2}{T}\int_0^{T/2} \left[2\cos\left(k\frac{2\pi}{T}t\right)dt\right] - \frac{2}{T}\int_0^T \left[\cos\left(k\frac{2\pi}{T}t\right)dt\right]$$

$$a_k = \frac{2}{T}\int_0^{T/2} \left[2\cos\left(k\frac{2\pi}{T}t\right)dt\right] - \frac{2}{T}\left[\frac{1}{k\frac{2\pi}{T}}\sin\left(k\frac{2\pi}{T}t\right)\right]\Bigg|_0^T$$

$$a_k = \frac{2}{T}\int_0^{T/2} \left[2\cos\left(k\frac{2\pi}{T}t\right)dt\right] - \frac{2}{T}\frac{1}{k\frac{2\pi}{T}}\left[\sin\left(k\frac{2\pi}{T}t\right)\right]\Bigg|_0^T$$

$$a_k = \frac{2}{T}\int_0^{T/2} \left[2\cos\left(k\frac{2\pi}{T}t\right)dt\right] - \frac{2}{T}\frac{T}{k2\pi}\left[\sin\left(k\frac{2\pi}{T}t\right)\right]\Bigg|_0^T$$

$$a_k = \frac{2}{T}\int_0^{T/2} \left[2\cos\left(k\frac{2\pi}{T}t\right)dt\right] - \frac{1}{k\pi}\left[\sin\left(k\frac{2\pi}{T}t\right)\right]\Bigg|_0^T$$

$$a_k = \frac{2}{T}\int_0^{T/2} \left[2\cos\left(k\frac{2\pi}{T}t\right)dt\right] - \frac{1}{k\pi}\left[\sin\left(k\frac{2\pi}{T}(T)\right) - \sin\left(k\frac{2\pi}{T}(0)\right)\right]$$

$$a_k = \frac{2}{T}\int_0^{T/2} \left[2\cos\left(k\frac{2\pi}{T}t\right)dt\right] - \frac{1}{k\pi}\left[\sin\left(k\frac{2\pi}{T}(T) - 0\right)\right]$$

$$a_k = \frac{2}{T}\int_0^{T/2} \left[2\cos\left(k\frac{2\pi}{T}t\right)dt\right] - \frac{1}{k\pi}\left[\sin(k2\pi) - 0\right]$$

$$a_k = \frac{2}{T}\int_0^{T/2} \left[2\cos\left(k\frac{2\pi}{T}t\right)dt\right] - \frac{1}{k\pi}\left[0 - 0\right]$$

$$a_k = \frac{2}{T}\int_0^{T/2} \left[2\cos\left(k\frac{2\pi}{T}t\right)dt\right]$$

$$a_k = \frac{4}{T}\int_0^{T/2} \left[\cos\left(k\frac{2\pi}{T}t\right)dt\right]$$

$$a_k = \frac{4}{T}\left[\frac{1}{k\frac{2\pi}{T}}\sin\left(k\frac{2\pi}{T}t\right)\right]\Bigg|_0^{T/2}$$

$$a_k = \frac{4}{T}\frac{1}{k\frac{2\pi}{T}}\left[\sin\left(k\frac{2\pi}{T}t\right)\right]\Bigg|_0^{T/2}$$

$$a_k = \frac{2}{k\pi}\left[\sin\left(k\frac{2\pi}{T}t\right)\right]\Bigg|_0^{T/2}$$

$$a_k = \frac{2}{k\pi}\left[\sin\left(k\frac{2\pi}{T}(T/2)\right) - \sin\left(k\frac{2\pi}{T}(0)\right)\right]$$

$$a_k = \frac{2}{k\pi}\left[\sin\left(k\frac{2\pi}{T}(T/2)\right) - 0\right]$$

$$a_k = \frac{2}{k\pi}[\sin(k\pi) - 0]$$

$$a_k = \frac{2}{k\pi}[0 - 0]$$

$$\boxed{a_k = 0}$$

finding b_k

$$b_k = \frac{2}{T}\int_0^T \left[(2P_{T/2}(t - T/4) - 1)\sin\left(k\frac{2\pi}{T}t\right)dt\right]$$

$$b_k = \frac{2}{T}\int_0^T \left[2P_{T/2}(t - T/4)\sin\left(k\frac{2\pi}{T}t\right)dt\right] - \frac{2}{T}\int_0^T \left[\sin\left(k\frac{2\pi}{T}t\right)dt\right]$$

$$b_k = \frac{2}{T}\int_0^T \left[2u(t)\sin\left(k\frac{2\pi}{T}t\right)dt\right] - \frac{2}{T}\int_0^T \left[2u\left(t - \frac{T}{2}\right)\sin\left(k\frac{2\pi}{T}t\right)dt\right] - \frac{2}{T}\int_0^T \left[\sin\left(k\frac{2\pi}{T}t\right)dt\right]$$

$$b_k = \frac{2}{T}\int_0^T \left[2u(t)\sin\left(k\frac{2\pi}{T}t\right)dt\right] - \frac{2}{T}\int_{T/2}^T \left[2\sin\left(k\frac{2\pi}{T}t\right)dt\right] - \frac{2}{T}\int_0^T \left[\sin\left(k\frac{2\pi}{T}t\right)dt\right]$$

$$b_k = \frac{2}{T}\int_0^T \left[2\sin\left(k\frac{2\pi}{T}t\right)dt\right] - \frac{2}{T}\int_{T/2}^T \left[2\sin\left(k\frac{2\pi}{T}t\right)dt\right] - \frac{2}{T}\int_0^T \left[\sin\left(k\frac{2\pi}{T}t\right)dt\right]$$

$$b_k = \frac{2}{T}\int_0^{T/2}\left[2\sin\left(k\frac{2\pi}{T}t\right)dt\right] - \frac{2}{T}\int_0^{T}\left[\sin\left(k\frac{2\pi}{T}t\right)dt\right]$$

$$b_k = \frac{2}{T}\left[\frac{-2}{k\frac{2\pi}{T}}\cos\left(k\frac{2\pi}{T}t\right)\right]\Bigg|_0^{T/2} - \frac{2}{T}\int_0^{T}\left[\sin\left(k\frac{2\pi}{T}t\right)dt\right]$$

$$b_k = \frac{-2}{k\pi}\left[\cos\left(k\frac{2\pi}{T}t\right)\right]\Bigg|_0^{T/2} - \frac{2}{T}\int_0^{T}\left[\sin\left(k\frac{2\pi}{T}t\right)dt\right]$$

$$b_k = \frac{-2}{k\pi}\left[\cos\left(k\frac{2\pi}{T}(T/2)\right) - \cos\left(k\frac{2\pi}{T}(0)\right)\right] - \frac{2}{T}\int_0^{T}\left[\sin\left(k\frac{2\pi}{T}t\right)dt\right]$$

$$b_k = \frac{-2}{k\pi}\left[\cos\left(k\frac{2\pi}{T}(T/2)\right) - 1\right] - \frac{2}{T}\int_0^{T}\left[\sin\left(k\frac{2\pi}{T}t\right)dt\right]$$

$$b_k = \frac{-2}{k\pi}[\cos(k\pi) - 1] - \frac{2}{T}\int_0^{T}\left[\sin\left(k\frac{2\pi}{T}t\right)dt\right]$$

$$b_k = \frac{-2}{k\pi}[(-1)^k - 1] - \frac{2}{T}\int_0^{T}\left[\sin\left(k\frac{2\pi}{T}t\right)dt\right]$$

$$b_k = \frac{-2}{k\pi}[(-1)^k - 1] - \frac{2}{T}\left[\frac{-1}{k\frac{2\pi}{T}}\cos\left(k\frac{2\pi}{T}t\right)\right]\Bigg|_0^{T}$$

$$b_k = \frac{-2}{k\pi}[(-1)^k - 1] - \frac{-1}{k\pi}\left[\cos\left(k\frac{2\pi}{T}t\right)\right]\Bigg|_0^{T}$$

$$b_k = \frac{-2}{k\pi}[(-1)^k - 1] - \frac{-1}{k\pi}\left[\cos\left(k\frac{2\pi}{T}(T)\right) - \cos\left(k\frac{2\pi}{T}(0)\right)\right]$$

$$b_k = \frac{-2}{k\pi}[(-1)^k - 1] - \frac{-1}{k\pi}\left[\cos\left(k\frac{2\pi}{T}(T)\right) - 1\right]$$

$$b_k = \frac{-2}{k\pi}[(-1)^k - 1] - \frac{-1}{k\pi}[\cos(k2\pi) - 1]$$

$$b_k = \frac{-2}{k\pi}[(-1)^k - 1] - \frac{-1}{k\pi}[1 - 1]$$

$$b_k=\frac{-2}{k\pi}\left[(-1)^k-1\right]-\frac{-1}{k\pi}[0]$$

$$\boxed{b_k=\frac{-2}{k\pi}\left[(-1)^k-1\right]}$$

finding

$$x(t)=\frac{1}{2}(0)+\sum_{k=1}^{\infty}\left[(0)\cos\left(k\frac{2\pi}{T}t\right)+\left(\frac{-2}{k\pi}\left[(-1)^k-1\right]\right)\sin\left(k\frac{2\pi}{T}t\right)\right]$$

$$x(t)=\sum_{k=1}^{\infty}\left[\left(\frac{-2}{k\pi}\left[(-1)^k-1\right]\right)\sin\left(k\frac{2\pi}{T}t\right)\right]$$

$$x(t)=\frac{-2}{\pi}\sum_{k=1}^{\infty}\left[\left(\frac{1}{k}\left[(-1)^k-1\right]\right)\sin\left(k\frac{2\pi}{T}t\right)\right]$$

$$x(t)=\frac{-2}{\pi}\sum_{k=1}^{\infty}\left[\left(\frac{1}{k}\left[(-1)^k-1\right]\right)\sin\left(k\frac{2\pi}{T}t\right)\right]$$

$$x(t)=\frac{2}{\pi}\sum_{k=1}^{\infty}\left[\left(\frac{1}{k}\left[1-(-1)^k\right]\right)\sin\left(k\frac{2\pi}{T}t\right)\right]$$

let $k=2n-1$

$$x(t)=\frac{2}{\pi}\sum_{2n-1=1}^{\infty}\left[\left(\frac{1}{2n-1}\left[1-(-1)^{(2n-1)}\right]\right)\sin\left((2n-1)\frac{2\pi}{T}t\right)\right]$$

$$x(t)=\frac{2}{\pi}\sum_{2n=2}^{\infty}\left[\left(\frac{1}{2n-1}\left[1-(-1)^{(2n-1)}\right]\right)\sin\left((2n-1)\frac{2\pi}{T}t\right)\right]$$

$$x(t)=\frac{2}{\pi}\sum_{n=1}^{\infty}\left[\left(\frac{1}{2n-1}\left[1-(-1)^{(2n-1)}\right]\right)\sin\left((2n-1)\frac{2\pi}{T}t\right)\right]$$

$$x(t)=\frac{2}{\pi}\sum_{n=1}^{\infty}\left[\left(\frac{1}{2n-1}\left[1-(-1)^{(2n)}(-1)\right]\right)\sin\left((2n-1)\frac{2\pi}{T}t\right)\right]$$

$$x(t)=\frac{2}{\pi}\sum_{n=1}^{\infty}\left[\left(\frac{1}{2n-1}\left[1+(-1)^{(2n)}\right]\right)\sin\left((2n-1)\frac{2\pi}{T}t\right)\right]$$

$$x(t)=\frac{2}{\pi}\sum_{n=1}^{\infty}\left[\left(\frac{1}{2n-1}\left[1+\left((-1)^{2}\right)^{n}\right]\right)\sin\left((2n-1)\frac{2\pi}{T}t\right)\right]$$

$$x(t)=\frac{2}{\pi}\sum_{n=1}^{\infty}\left[\left(\frac{1}{2n-1}\left[1+1^{n}\right]\right)\sin\left((2n-1)\frac{2\pi}{T}t\right)\right]$$

$$x(t)=\frac{2}{\pi}\sum_{n=1}^{\infty}\left[\left(\frac{1}{2n-1}\left[1+1\right]\right)\sin\left((2n-1)\frac{2\pi}{T}t\right)\right]$$

$$x(t)=\frac{2}{\pi}\sum_{n=1}^{\infty}\left[\left(\frac{1}{2n-1}\left[1\right]\right)\sin\left((2n-1)\frac{2\pi}{T}t\right)\right]$$

$$x(t)=\frac{2}{\pi}\sum_{n=1}^{\infty}\left[\left(\frac{2}{2n-1}\right)\sin\left((2n-1)\frac{2\pi}{T}t\right)\right]$$

$$\boxed{x(t)=\frac{4}{\pi}\sum_{n=1}^{\infty}\left[\left(\frac{1}{2n-1}\right)\sin\left((2n-1)\frac{2\pi}{T}t\right)\right]}$$