$$b_n = \frac{1}{l}\int_c^{c+21} F(x) = \varepsilon.\frac{n\pi}{l}xdx = 2\int_0^1 \frac{1}{2}\left(c^{2x} - e^{-2x}\right)\varepsilon.2n\pi xdx =$$

$$\int_0^1 \left(e^{2x} - e^{-2x}\right)\varepsilon.2n\pi xdx = \int_0^1 e^{2x}\varepsilon.2n\pi xdx + \int_0^1 -e^{-2x}\varepsilon.2n\pi xdx$$

$$I = \frac{-e^{2x}}{2n\pi}\cos 2n\pi x + \frac{e^{2x}}{2n\pi}\varepsilon.2n\pi x - \frac{1}{n\pi}I\Big|_0^1$$

$$\left(1+\frac{1}{n^2\pi^2}\right)I_1 = \left(\frac{-e}{2n\pi} - \frac{-1}{2n\pi}\right) \rightarrow I = \frac{n\pi\left(1-e^{-2}\right)}{2\left(1+n^2\pi^2\right)}$$

$$I_2 = \frac{e^{-2x}}{2n\pi}\cos 2n\pi x + \frac{e^{-2x}}{2n^2\pi^2}\varepsilon.2n\pi x - \frac{1}{n^2\pi^2}I_2\Big|_0^1$$

$$I_2\left(1+\frac{1}{n^2\pi^2}\right) = \left(\frac{e^{-2}}{2n\pi} - \frac{1}{2n\pi}\right) \rightarrow I_2 = \frac{n\pi\left(e^{-2}-1\right)}{2\left(1+n^2\pi^2\right)}$$

$$\rightarrow b_n = 0$$

$$F(x) = \left(\frac{e^2+e^{-2}}{4} - \frac{1}{2}\right) + \sum_{n=1}^{\infty}\frac{e^2+e^{-2}-2}{2\left(1+n^2\pi^2\right)}\cos 2n\pi x$$

سری سینوسی فوریه:

$a_n = 0$

$$b = 2\int_0^1 \frac{1}{2}(e-e)\varepsilon.n\pi x = \int_0^1 e^{2x}\varepsilon.n\pi xdx + \int e^{-2x}\varepsilon.n\pi xdx$$

I_1 I_2

$$I_1 = \frac{-e^{2x}}{n\pi}\cos n\pi x + \frac{2e^{2x}}{n^2\pi^2}\varepsilon.n\pi x - \frac{4}{n^2\pi^2} I_1 \Big|_0^1$$

$$I_1 = \frac{n\pi\left(1+e^2(-1)^{n+1}\right)}{n^2\pi^2+4}$$

$$I_2 = \frac{e^{-2x}}{n\pi}\cos n\pi x + 2e^{-2x}\Big/n^2\pi^2\ \varepsilon.n\pi x - \frac{4}{n^2\pi^2} I_1 \Big|_0^1$$

$$I_2 = \frac{e^{-2}(-1)^n - 1}{4+n^2\pi^2}$$

$$b_n = \left(\frac{n\pi e^2(-1)^{n+1}}{n^2\pi^2+4} + e^{-2}(-1)^n\right)$$

$$F(x) = \sum_{n=1}^{\infty} b_n \varepsilon.n\pi x dx$$

سری cosای فوریه :

$$b_n = 0 \qquad a = \frac{e^2+e^{-2}}{2} - 1$$

$$a_n = 2\int_0^1 \tfrac{1}{2}\left(e^{2x} - e^{-2x}\right)\cos n\pi x = \int_0^1 e^{2x}\cos n\pi x + \int_0^1 -e^{-2x}\cos n\pi x$$

I_1 $\qquad$ I_2

$$I_1 = \frac{e^{2x}}{n\pi}\varepsilon.n\pi x + \frac{2e^{2x}}{n^2\pi^2}\cos n\pi x - \frac{4}{n^2\pi^2} I_1 \Big|_0^1$$

$$I_1 = \frac{2e^2(-1)^n - 2}{4+n^2\pi^2}$$

$$I_2 = \frac{-e^{-2x}}{n\pi}\varepsilon.n\pi x + \frac{2e^{-2x}}{n^2\pi^2}\cos n\pi x - \frac{4}{n^2\pi^2} \times I_1$$

$$I = \frac{2e^{-2}(-1)^n - 2}{4+n^2\pi^2} \qquad a_n = I_1 + I_2 = \frac{2e^e(-1)^n + 2e^{-2}(-1)^n - 4}{4+n^2\pi^2}$$

$$F(x) = \frac{a_0}{2} + \sum_{n=1}^{\infty} a_n \cos n\pi x$$

سری مختلط نمايي فوریه :

$$C_n = \tfrac{1}{2}(a_n - ib_n) = \tfrac{1}{2}\left(\frac{1(e^2 + e^{-2} - 2)}{2(1+n^2\pi^2)}\right) = \frac{e^2 + e^{-2} - 2}{4(1+n^2\pi^2)}$$

$$F(x) = \sum_{n=-\infty}^{\infty} c_n e^{\frac{n\Pi}{l} ix} = \sum_{n=-\infty}^{\infty} \frac{e^2 + e^{-2} - 2}{4(1+n^2\pi^2)} e^{2nix}$$

سری هارمونیک nام :

$$A_n = \sqrt{a_n^2 + b_n^2} \rightarrow A_n = \frac{(e^2 + e^{-2} - 2)}{2(1+n^2\pi^2)}$$

$$\beta_n = tg^{-1}\left(\frac{b_n}{a_n}\right) = tg^{-1}(0) \Rightarrow$$

$$F(x) = A_0 + \sum_{n=1}^{\infty} A_n\left(\cos\left(\frac{n\pi}{l}x - \beta_n\right)\right) = \left(\frac{e^2 - e^{-2}}{4} - \tfrac{1}{2}\right) + \sum_{n=1}^{\infty} \frac{(e^2 + e^{-2} - 2)}{2(1+n^2\pi^2)} \cos 2n\pi x$$

$$F(x) = \begin{cases} x^2 & -1 \le x \le 0 \\ x^3 & 0 \le x \le 1 \end{cases} \rightarrow 2l = 2 \rightarrow l = 1$$

$$a_0 = \frac{1}{l}\int_c^{c+21} F(x)dx = \left(\int_{-1}^{0} x^2 dx + \int_0^1 x^3 dx\right) = \tfrac{1}{3} + \tfrac{1}{4} = \tfrac{1}{12}$$

$$a_n = \tfrac{1}{l}\int_c^{c+21} \cos n\pi F(x)dx = \left(\int_{-1}^{0} x^2 dx + \int_0^1 x^3 \cos n\pi x dx\right)_{-1}^{0}$$

I_1	I_2
x^2	$\cos n\pi x$

$2x$	$\frac{1}{n\pi}\varepsilon.n\pi x$
2	$-\frac{1}{n^2\pi^2}\cos n\pi x$
	$-\frac{1}{n^3\pi^3}\varepsilon.n$

$$I_1=\frac{x^2}{n\pi}\varepsilon.n\pi x+\frac{2n}{n^2\pi^2}\cos n\pi x-\frac{2}{n^3\pi^3}\varepsilon.n\pi x\Big|_{-1}^{0}$$

$$\left(-\frac{-2}{n^2\pi^2}\cos 2-n\pi\right)=\frac{2(-1)^n}{n^2\pi^2}$$

$$I_2=\left(\frac{x^3}{n\pi}\varepsilon.n\pi x+\frac{3x^2}{n^2\pi^2}\cos n\pi x-\frac{6x}{n^3\pi^3}\varepsilon.n\pi x-\frac{6}{n^4\pi^4}\cos n\pi x\right)_0^1$$

$$\left(\left(\frac{3}{n^2\pi^2}-\frac{6}{n^4\pi^4}\right)(-1)^n+\frac{6}{n^4\pi^4}\right)=\frac{3(-1)^n}{n^2\pi^2}+\frac{6}{n^4\pi^4}(1+(-1)^{n+1})$$

$$a_n=\frac{5(-1)^n}{n^2\pi^2}+\frac{6}{n^4\pi^4}\left(1+(-1)^{n+1}\right)=\begin{cases}\frac{5}{n^2\pi^2}:n=odd\\ -\frac{5}{n^2\pi^2}+\frac{12}{n^4\pi^4}:n=odd\end{cases}$$

$$b_n=\frac{1}{l}\int_c^{c+21}F(x)\varepsilon.\frac{n\pi}{l}xdx=\left(\int_{-1}^{0}x^2\varepsilon.n\pi xdx+\int_0^1x^3\varepsilon.n\pi xdx\right)$$

I_1 I_2

$$I_1 = \left(-\frac{x^2}{n\pi}\cos n\pi x + \frac{2n}{n^2 \times \pi^2}\varepsilon . n\pi x + \frac{2}{n^3\pi^3}\cos n\pi x \right)_{-1}^{0}$$

$$\frac{2}{n^3\pi^3} - \left(\frac{-1}{n\pi}(-1)^n + \frac{2}{n^3\pi^3}(-1)^n \right) = \frac{2}{n^3\pi^3} + \frac{(-1)^n}{n\pi} + \frac{2(-1)^{n+1}}{n^3\pi}$$

$$I_2 = \left(\frac{-x^3}{n\pi}\cos n\pi x + \frac{3x^2}{n^2\pi^2}\varepsilon . n\pi x + \frac{6x}{n\pi}\cos n\pi x - \frac{6}{n^3\pi^3}\varepsilon . n\pi x \right)_0^1 = \left(\frac{(-1)^{n+1}}{n\pi} + \frac{6}{n^3\pi^3}(-1)^x \right)$$

$$= (-1)^n \left(\frac{6}{n^3\pi^3} - \frac{1}{n\pi} \right)$$

$$b_n = I_1 + I_2 = \frac{2}{n^3\pi^3} + \frac{(-1)^n}{n\pi} + \frac{-2(-1)^n}{n^3\pi^3} + \frac{(-1)^n 6}{n^3\pi^3} - \frac{(-1)^n}{n\pi}$$

$$= \frac{4(-1)^n}{n^3\pi^3} + \frac{2}{n^3\pi^3} = \frac{1}{n^3\pi^3}\left(4(-1)^n + 2\right)$$

$2l = 2 \to l = 1$ $\qquad$ $F(x) = \begin{cases} (x-2)^2 & 1 \le x \le 2 \\ 3^3 & 0 \le x < 1 \end{cases}$

$a_0 = 5/12$

$$a_n = 1/l \int_c^{c+21} F(x) \cos n\pi/l \, xdx$$

$$\int_0^1 n^3 \cos n\pi^1 xdx + \int_1^2 (x-2)^2 \cos n\pi/1 \, xdx = \frac{5(-1)^n}{n^2\pi^2} + \frac{6}{n^4\pi^4}(1 + (-1)^{n+1})$$

$$b_n = 1/l \int_c^{c+21} F(x)\varepsilon . \frac{n\pi}{l} xdx = \left(\int_0^1 x^3 \varepsilon . n\pi x dx + \int_1^2 (x-2)^2 \varepsilon . n\pi x dx \, \frac{1}{n^3\Pi^3} \left(4(-1)^n + 2\right) \right.$$

$$b_n = 1/n^3\pi^3 \left(4(-1)^n + 2\right)$$

ســــــــــرى

سینوسی تابع جدید :

$$F(x)\begin{cases} -(x+2)^2 & -2\le x\le -1 \\ x^3 & -1\le x\le 1 \\ (x-2)^2 & 1\le x\le 2 \end{cases}$$

$2l=4$

$\rightarrow l=2$

$a_n=0 \qquad b_n=\int_0^1 x\varepsilon.\frac{n\pi}{2}xdx+\int_1^2 (x-2)\varepsilon.\frac{n\pi}{2}xdx$

$I_1 \qquad I_2$

$$I_1=\frac{-2x^3}{n\pi}\cos\frac{n\pi}{2}x+\frac{12x^2}{n^2\pi^2}\varepsilon.\frac{n\pi}{2}x+\frac{48x}{n^3\pi^3}\cos\frac{n\pi}{2}x-\frac{76}{n^4\pi^4}\varepsilon.\frac{n\pi}{2}x\Big|_0^1$$

$$=\cos\frac{n\pi}{2}\left(\frac{-2}{n\pi}+\frac{48}{n^3\pi^3}\right)+\varepsilon.{n\pi}/{2}\left(\frac{12}{n^2\pi^2}-\frac{96}{n^4\pi^4}\right)$$

$$I_2=\frac{-2(x-2)^2}{n\pi}\cos\frac{2\pi}{2}x+\frac{4(2n-4)}{n^2\pi^2}\varepsilon.\frac{n\pi}{2}x+\frac{16}{n^3\pi^3}\cos\frac{n\pi}{2}x\Big|_1^2$$

$$=\frac{16}{n^3\pi^3}(-1)^n-\left(\frac{-2}{n\pi}\cos\frac{n\pi}{2}+\frac{-8}{n^2\pi^2}\varepsilon.\frac{n\pi}{2}+\frac{16}{n^3\pi^3}\cos\frac{n\pi}{2}\right)$$

$$b_n=\frac{32}{n^3\pi^3}\cos\frac{n\pi}{2}+\left(\frac{20}{n^2\pi^2}-\frac{96}{n^4\pi^4}\right)\varepsilon.\frac{n\pi}{2}+\frac{16(-1)^n}{n^3\pi^3}$$

$$=\frac{16}{n^3\pi^3}(-1)^n+\left(\frac{2}{n\pi}-\frac{16}{n^3\pi^3}\right)\cos\frac{n\pi}{2}+\frac{8}{n^2\pi^2}\varepsilon.{n\pi}/{2}$$

$b_n=I_1+I_2 \qquad F(x)\sum_{n=1}^{\infty}b_n\varepsilon.{n\pi}/{2}\,x$

سری کسینوس فوریه :

$$F(x)\begin{cases} (x+2)^2 : -2\le x\le -1 \\ -x^3 : -1\le x\le 0 \\ x^3 : 0\le x\le 1 \\ (x-2)^2 : 1\le x\le 2 \end{cases}$$

$2l=4\rightarrow l=2$

$a_0={7}/{12}$

$a_n=\int_0^1 x^3\cos{n\pi}/{2}\,xdx+\int_1^2 (x-2)^2 5{n\pi}/{2}\,xdx=$

$I_1 \qquad I_2$

$$I_1 = \left(\frac{2}{n\pi} - \frac{48}{n^3\pi^3}\right)\varepsilon.\frac{n\pi}{2} + \left(\frac{12}{n^3\pi^3} - \frac{96}{n^4\pi^4}\right)\cos\frac{n\pi}{2} + \frac{96}{n^4\pi^4}$$

$$I_2 = \left(\frac{16}{n^3\pi^3} - \frac{2}{n\pi}\right)\varepsilon.\frac{n\pi}{2} + \frac{8}{n^2\pi^2}\cos{}^{n\pi}\!/_{2}, a_n = I_1 + I_2$$

$$F(x) = \frac{a_0}{2} + \sum_{n=1}^{\infty} a_n \varsigma\, {}^{n\pi}\!/_{2}\, x dx$$

سری مختلط نمایي فوریه :

$$C_n = {}^1\!/_2 (a_n - ib_n)$$

$${}^1\!/_2\left(\frac{5(-1)^2}{n^2\pi^2} + \frac{6}{n^4\pi^4}(1+(-1)^{n+1})\right) - \frac{i}{n^3\pi^3}\left(4(-1)^x + 2\right)$$

$$C_0 = a_{0/2} = {}^7\!/_{24} \qquad F(x) = C_0 + \sum_{-\infty}^{\infty} c_n e^{n\Pi/l\, in}$$

دامنه مرکب:

$$A_n = \sqrt{a_n^2 + b_n^2}$$

$$\sqrt{\frac{25}{n^4\pi^4} + \frac{36}{n^8\pi^8}(1+(-1)^{x+1})^2 + \frac{60}{n^6\pi^6}\left((-1)+(-1)^{2n+1}\right) + \frac{1}{n^6\pi^6}\left(4(-1)^n + 2\right)^2}$$

$$\beta_n = tg^{-1}\left({}^{b_n}\!/_{a_n}\right), A_0 = \frac{a_0}{2} = {}^7\!/_{24}$$

$$F(x) = A_0 + \sum_{n=1}^{\infty} A_n\left(\cos\frac{n\pi}{l}x - \beta_n\right) = A_0 + \sum_{n=1}^{\infty} A_n \varepsilon.\left(\frac{n\pi}{l}x + \alpha_n\right)$$

اتحاد دیریکله سوال 19:

$$F(x) = \frac{a}{2} + \sum_{n=1}^{\infty} a\cos{}^{n\pi}\!/_{2}\,x + b\varepsilon.{}^{n\pi}\!/_{2}\,x$$

$$F(x) = \frac{7}{24} + \sum_{n=1}^{\infty}\left(\frac{5(-1)^n}{n^2\pi^2} + \frac{6}{n^4\pi^4}\right)\left(1+(-1)^{n+1}\right)\cos n\pi x + {}^1\!/_{n^3\pi^3}\left(4(-1)^n + 2\right)\varepsilon.n\pi x$$

$x=0$

$$0=\frac{7}{24}+\sum_{n=1}^{\infty}\frac{(-1)^n}{n^n\pi^n}+\frac{6}{n^4\pi^4}\left(4(-1)^{n+1}\right)\to\frac{7}{24}=\frac{5(-1)^{n+1}n^2\pi^2-6\left(1+(-1)^{n+1}\right)}{n^4\pi^4}$$

$$=\frac{(-1)^{n+1}(5n^2\pi-6)-6}{n^4\pi^4}$$

$x=1$ $$F(x)=\frac{7}{24}+\sum_{n=1}^{\infty}5/n^2\pi^4+\frac{6(-1)^n}{n^4\pi^4}(+1+(-1)^{n+1})$$

اتحاد پارسوال سوال 18:

$$a_0=\frac{e^2+e^{-2}-2}{2}$$

$$a_0=\frac{e^2+e^{-2}-2}{2(1+n^2\Pi^2)} \qquad b_n=0 \qquad l=1/2$$

اتحاد پارسوال: $\frac{1}{l}\int_{-l}^{l}F^2(x)=\frac{a_0^2}{2}+\sum_{n=1}^{\infty}\left(a_n^2+b_n^2\right)$

$$1/2\times 2\int_{-1/4}^{1/4}1/4\left(e^{4x}+e^{-4x}-2\right)dx=\frac{\left(e^4+e^{-4}+4+24e^2-4e^{-2}\right)}{8}+\sum_{n=1}^{\infty}\frac{e^4+e^{-4}+4+2-4e^2-4e^{-2}}{4(1+\pi^4n^4+2n^2\pi^2)}$$

طرف اول:

$$1/2\left(1/4e^{4x}-1/4e^{-4x}-2x\right)^{1/2}=1/2\left(\left(1/4e^2-1/4e^{-2}-1\right)-\left(1/4e^{-2}-1/4e^2+1\right)\right)$$
$$=1/2\left(1/2e^2-1/2e^{-2}-2\right)=1/4e^2-1/4e^{-2}-1$$

طرف دوم: $$\frac{e^4}{8}+\frac{e^{-4}}{8}+3/4-1/2e^2-1/2e^{-2}+\sum_{n=1}^{\infty}\frac{\left(e^4+e^{-4}+6-4e^2-4e^{-2}\right)}{4\left(1+n^4\pi^4+2n^2\pi^2\right)}$$ طرف
$$=1/4e^2-1/4e^{-2}-1$$

اول

$$\to\sum_{n=1}^{\infty}\frac{1}{\left(1+n^2\pi^2\right)^2}=\frac{3e^2+e^{-2}-e4/2-e-4/2-7}{e^4+e^{-4}+6-4e^2-4e^{-2}}$$

جواب سوال 20

$$F(x)=\begin{cases}1/\pi\ \varepsilon.\pi x & -1\le x\le 0\\ x-2n+x+x & 0<x<1\end{cases}\qquad 2l=2\to l=1$$

$$a_0=\left(\int_{-1}^{0}1/\Pi\ \varepsilon.\pi x dx+\int_{0}^{1}x^4-2x^2+x^2+x\right)=\left(-1/\pi^2\ \cos\pi x\right)_{-1}^{0}+\left(\frac{x^5}{5}-1/2\,x^4+x^3/3+x^2/2\right)_0^1$$

$$=\left(-1/\pi^2\right)(1-(-1))+\left(\frac{1}{5}-1/2+1/3+1/2\right)=-2/\pi^2+\frac{8}{15}$$

$$a_n=1/l\int_{c}^{c+21}F(x)\cos n\pi/l\,xdx=\left(\int_{-1}^{0}1/\pi\ \varepsilon.\pi x\cos n\pi xdx+\int_{0}^{1}\left(x^4-2x^3+x^2+x\right)\cos\pi xdx\right)$$

I_1 $\qquad$ I_2

$$\Rightarrow I_1=\int_{-1}^{0}1/\pi\left(1/2\left[\varepsilon(\pi x+n\pi x)+\varepsilon(\pi x-n\pi x)\right]\right)=$$

$$=1/2\pi\left(-\frac{1}{\pi+n\pi}\cos x(\pi+n\pi)-\frac{1}{(\pi-n\pi)}(\cos n(\pi-n\pi))\right)_{-1}^{0}$$

$$1/2\pi\left(-1/\pi+n\pi-1/\pi-n\pi\right)-\left(\left(\frac{+1}{\pi+n\pi}\right)\cos(n+1)\pi\right)_{-1}^{0}$$

$$=1/2\pi\left(-\frac{1}{\pi+n\pi}-1/\pi-n\pi\right)-\left(\frac{-1}{\pi+n\pi}\cos(n+1)\pi-\frac{1}{\pi-n\pi}\cos(n-1)\pi\right)$$

$$1/2\pi\left[\frac{-2\pi}{\pi^2-n^2\pi^2}+\cos(n+1)\pi\left(\frac{1}{\pi+n\pi}+\frac{1}{\pi-n\pi}\right)\right]$$

$$=1/2\pi\left[\frac{-2\pi}{\pi^2-n^2\pi^2}+\cos(n+1)\pi\frac{2\pi}{\pi^2-n^2\pi^2}\right]$$

$$=\frac{\cos(n+1)\Pi-1}{\pi^2-n^2\pi^2}=\frac{(-1)^{n+1}-1}{\pi^2-n^2\pi^2}=\begin{cases}-\dfrac{2}{\pi^2-n^2\pi^2}:n=even\\ 0:n=odd\end{cases}$$

$$I_2 = \left[\frac{x^4 - 2x^2 + x^2 + x}{n\pi} \varepsilon.n\pi x + \frac{4x^3 - 6x^2 + 2x + 1}{n^2\pi^2} \cos n\pi x - \frac{\left(12x^2 - 12x + 2\right)}{n^3\pi^3} \varepsilon.n\pi x - \right.$$

$$\left. \frac{24x - 12}{n^4\pi^4} \cos n\pi x + \frac{24}{n^3\pi^3} \varepsilon.n\pi x \right]_0^1$$

$$= \left[(-1)^n \left(\frac{1}{n^2\pi^2} - \frac{12}{n^4\pi^4} \right) \right] - \left(\frac{1}{n^2\pi^2} + \frac{12}{n^4\pi^4} \right)$$

$$\frac{1}{n^2\pi^2}\left((-1)^n - 1\right) - \frac{12}{n^4\pi^4}\left((-1)^n - 1\right) = \begin{cases} -\dfrac{24}{n^4\pi^4} \; n = even \\ -\dfrac{2}{n^2\pi^2} \; n = odd \end{cases}$$

$$a_n = \begin{cases} -\dfrac{24}{n^4\pi^4} - \dfrac{2}{n^2 - n^2\pi^2} : n = even \, \wp \neq 0 \\ -\dfrac{2}{\pi^2 n^2} : n = odd \end{cases}$$

$$b_n = \tfrac{1}{l} \int_c^{c+21} F(x)\varepsilon.\frac{n\pi}{l} x dx = \int_{-1}^{0} \tfrac{1}{\pi} \varepsilon.\pi x n\pi x dx + \int_0^1 \left(x^4 - 2x^3 + x^2 + x\right)\varepsilon.n\pi x dx$$

$$I = \int_{-1}^{0} \tfrac{1}{\pi}\left(\tfrac{1}{2}\cos(\pi x - n\pi x)\cos(\pi x + n\pi x)\right) =$$

$$= \left[\tfrac{1}{2\pi} \left[\frac{1}{\pi - n\pi} \varepsilon.x(\pi - n\pi) - \frac{1}{\pi + n\pi} \varepsilon.x(\pi + n\pi) \right] \right]_{-1}^{0} = 0$$

$$I_2 = \frac{-(x^4 - 2x^3 + x^2 + x)}{n\pi} \cos n\pi x + \frac{4x^3 - 6x^2 + 2x + 2}{n^2\pi^2} \varepsilon.n\pi x + \frac{12x^2 - 12x + 2}{n^3\pi^3} \cos n\pi x$$

$$- \frac{(24x - 12)}{n^4\pi^4} \varepsilon.n\pi x - \frac{24}{n^5\pi^5} \cos n\pi x \Big|_0^1$$

$$= \left[\frac{-(-1)^n}{n\pi} + \frac{2(-1)^n}{n^3\pi^3} - \frac{24}{n^5\pi^5}(-1)^n \right] - \left[\frac{2}{n^3\pi^3} - \frac{24}{n^5\pi^5} \right]$$

$$= (-1)^n \left(\frac{2}{n^3\pi^3} - \frac{24}{n^5\pi^5} - \frac{1}{n\pi} \right) + \frac{24}{n^5\pi^5} - \frac{2}{n^3\pi^3}$$

$$b_n = I_2 = \begin{cases} -\tfrac{1}{n\pi} : n - even \neq 0 \\ -\dfrac{4}{n^3\pi^3} + \dfrac{48}{n^5\pi^5} + \dfrac{1}{n\pi} : n = odd \end{cases}$$

$$F(x) = \frac{a_0}{2} + \sum_{n=1}^{\infty} a \cos n\pi x + b\varepsilon.n\pi x$$