

## GALLANDALIO STANILLIO SALINO LOCALIA (ALCALANDALIO) (ALCALANDALIO)

	FOURIER SERIES
•	
	Even Function
	·If f(-x)= f(x) then f(x) is said to be
	even function.
	eg. cosx, x2, 1x1, Isinx1
2>	Odd Function
	If f(-x) = -f(x) then f(x) is said to be
	odd function.
	eq. $\sin x$ , $\alpha$ , $\alpha^3$ .
1 1	3
12	Note + f(x)=ex is neither even nor odd function
18	(as f(-x)=e-x + f(x) & +-f(x))
3)	of france = 2 safranda - if fran is even
100	_a)
	= 0 — if frx) is odd
4	$f(x) = f_1(x) \cdot f_2(x)$
	JUND E O E O
	f2(x) E O O E
19-1	f(x)=f(x)-f₂(x) E € 0 0
6	
5	It nis integer
	Sin n = 0 - Sin 2n = 0.
2	$\cos n\pi = c - 0^n$ : $\cos 2n\pi = 1$
187	
	Prof. Nancy Sinollin



# A. P. SHELL INSPERIENCE OF TRACLINGUACY (Approved by ACCR Not Boths & Gree, of Subsension, Affiliated to University of Students) (Refigeous Jun Muselle)

	Dirichlet's Conditions:
	If far is defined in the interval CIEXECO
	can be expressed as fourier series if in the interval
	2) f(x) has finite number of discontinuties.
	3) f(x) has finite number of maxima and minima.
_	These conditions are known as Dirichlet's Conditions.
	Determination of Fourier Co-efficients
	(Euler's Formulae)
1>	If f(x) is defined in interval (cic+28)
	then Fourier Series of fraz is given by.
	then Fourier Series of $f(x)$ is given by, $f(x) = \frac{a_0}{2} + \sum_{n=1}^{\infty} a_n \cos(n\pi x) + \sum_{n=1}^{\infty} b_n \sin(n\pi x)$
	2 n=1 (2) = (2)
	$a_0 = 1$ $f^{c+2l} = f(x) dx$
	L <sub>c</sub> )
.97	$a_0 = \frac{1}{L_c} \int_{c+2L}^{c+2L} f(x) dx$ $a_n = \frac{1}{L_c} \int_{c}^{c+2L} f(x) \cos\left(\frac{n\pi x}{L}\right) dx$
16.	10)
	bn= 1 (+2) sin(nnx) da
	(1)
	• Para - Mar - the state -
	· Parseval's Identity
	If frais defined in interval (c, (+21) then
	by Parseval's Identity
	$\frac{1}{2}\left(\frac{1}{2}\left(\frac{1}{2}\left(\frac{1}{2}\right)^{2}\right)^{2}dx-\frac{1}{2}\left(\frac{1}{2}\left(\frac{1}{2}\right)^{2}+\frac{1}{2}\left$
	h-1
	Prof. Nancy Sinollin
A.	1 Tol. Nancy official
ndaram	FOR EDUCATIONAL USE
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# A. D. SIELII INSUMPUME OF MEDITIONS OF MEDITIONS OF MEDITIONS OF MEDITIONS OF MEDITION OF STREET

2>	If fran is defined in interval (-1,1), then
	we can check fran is even or odd.
	Case 1:
	If $f(x)$ is even $\Rightarrow b_n=0$ ,
	then fourier series of fran is given by  fran = ao + 5 an cos(nmx)
	fax= ao + 5 an cos(nTX)
	$a_0 = \frac{2}{10} \int_0^1 f(x) dx$
	0
	an - 2 Sefra cos (nox) dx
	10 (1)
7 x 1	Hence,
	Parseval's Identity is  2 Stephan - and + \sum and
	2 / N=1
131	Case 2:-
	If f(x) is odd => a0=0, an=0.
100	then Emirier Series of fext is given by.
	$f(x) = \sum_{n=1}^{\infty} b_n \sin\left(\frac{n\pi x}{1}\right)$
	Fel (1)
	bn = 2 ( fra) sin (nax) da
(1)	10)
8	Hence,
	Parseval's Identity is
13.	$2 \left( \frac{1}{2} \left[ f(x) \right]^2 dx = \frac{5}{2} b^2$
70	Tal LTTT
	Note:
	If for is neither even nor odd then we have to
the v	use formulae written in 1>
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### AL PA SHALL INSPRIENTE OF TESTINOLOGY (Approved by ALCEL Son Bullet & Grow, of Madematica, Additional to Tennestry of Humanos) (Metaphon Jun Manuschy)

-	
3>	Half Range Series
1	Half Range series of f(x) is defined on interval
	(0,1)
	1) Half Range Cosine Sonies
	Uses la C
	$\frac{1}{100} - \frac{a_0}{2} + \sum_{n=1}^{\infty} a_n \cos\left(\frac{n\pi x}{2}\right)$
	2 hai (2)
	$a_0 = \frac{2}{2} \int_{-\infty}^{\infty} f(x) dx$
	an= 2 (1f(x) cos (ngx) an
	8
	: Hence , Parseval's Identity
	Hence, Parseval's Identity $2 \int_{0}^{\infty} \left[f(\alpha)\right]^{2} d\alpha = \frac{a_{0}^{2}}{2} + \sum_{n=1}^{\infty} a_{n}^{2}$
_	0 ,21 .
-	2) Half Range Sine Series
4	Here, ao= o l an=o
-	Here, $a_0=0$ & $a_0=0$ $f(x) - \sum_{n=1}^{\infty} b_n \sin(n\pi x)$
-	ned ( 1 /.
-	$b_n = \frac{2}{1} \int_{-\infty}^{1} f(x) \sin(n\pi x) dx.$
-	
-	Hence, Parseval's Identity
-	$\frac{2}{2} \int_{a}^{b} \left[ f(x) \right]^{2} dx = \sum_{n}^{b} b^{n}$
-	nol .
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### A SIGN DESTRUCTE OF TESTINOLOGY (Approved by AR. II. Nov. Belle & Gro. of Malamatory, Affiliated to Tennestry of Standard (Refigious Jun Malamatory)

	Problems:
1	Find Fourier Series of f(x)=x2 in (0,211).
	Hence find 112 = 1 - 1
Soln	Comparing with (C; C+21)
	$C(C,C+28) = (0,2\pi)$
	⇒ C=0 & C+21 = 2# ⇒ 0+21=2# ⇒ 1=1
	$\frac{As_{1}}{4(\alpha)} = \frac{a_{0}}{2} + \sum_{n=1}^{\infty} a_{n} \cos\left(\frac{n\pi x}{x}\right) + \sum_{n=1}^{\infty} b_{n} \sin\left(\frac{n\pi x}{x}\right)$ $= \frac{a_{0}}{2} + \sum_{n=1}^{\infty} a_{n} \cos nx + \sum_{n=1}^{\infty} b_{n} \sin nx - 1$
	2 / (1) / (1)
	= ao , 5 an cosna + 5 bn sinna - 1)
12	2   751 751
	$\frac{a_0 - 1}{1} \int_{-1}^{C+21} f(x) dx$ $= \frac{1}{11} \int_{-1}^{211} x^2 dx$
	, c 2tt - 2 1
21.5	T a x ax
	$-\frac{1}{\pi} \left[ \frac{\chi^3}{3} \right]^{2\pi}$
	п 3 0
. 2.	$\frac{1}{\pi} \left( \frac{8\pi^3}{3} \right) = \frac{8\pi^2}{3}$
l.	
	an = 1 (C+21 frx) cos (nox) dx
	1 (21 x2 Corner da
	$=\frac{1}{\pi}\int_{0}^{2\pi} x^{2} \cos nx  dx$
	$= 1 \left[ \chi^2 \left( \sin n \chi \right) - (2 \chi) \left( -\cos n \chi \right) + 2 \left( -\sin n \chi \right) \right]$
	$\Pi$ $(n)$ $(n^2)$ $(n^3)$
(5. 10);	$-1 \left[0-4\pi \left(-\cos 2n\pi\right) + 0 - 0 + 0 - 0\right]$
	$n^2$ $sinant=0$
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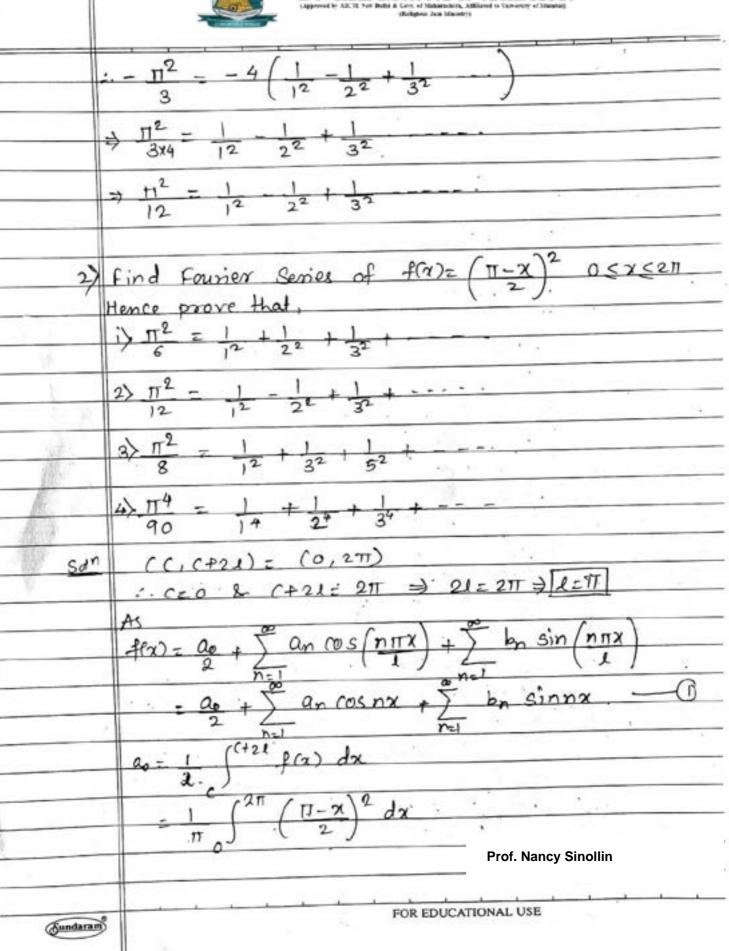


#### A. P. SHELH INSPIRED OF TECHNOLOGY (Approved by AICH Nov Both & Corp. of Substratory, Affiliand to University of Stratogy

	= 1 [ 47]
	H . n2
	$a_n = \frac{4}{n^2}$
	bo = 1 (c+21 f(x) sin(nnx) dx
	$-\frac{1}{\pi}\int_{-1}^{2\pi} x^2 \sin nx  dx$
7	$= \frac{1}{11} \left[ \frac{\chi^2(-\cos n\chi) - (2\chi)(-\sin n\chi)}{n^2} + \frac{2(+\cos n\chi)}{n^3} \right]^{\frac{2}{11}}$
3	$=\frac{1}{\pi}\left[\frac{4\pi^{2}\left(-\cos 2n\pi\right)-0+2\cos 2n\pi-0+0-2\left(1\right)}{n^{3}}\right]$
	$=\frac{1}{\pi}\left[-4\pi^{2}\left(\frac{1}{n}\right)+2\left(\frac{1}{n^{3}}\right)-2\left(\frac{1}{n^{3}}\right)\right]$
	- 1 x -4n2
	и n
	4n
,	$f(x) = \frac{1}{8\pi^2} + \sum_{n=1}^{\infty} \frac{4}{n^2} \cos nx + \sum_{n=1}^{\infty} \left(-\frac{4\pi}{n}\right) \sin nx$
	$\chi^2 = 4\pi^2$ , $4\sqrt{9}$ (as $n\chi = (-4\pi)\sqrt{9}$ sin $n\chi$
_	3 nel nº nel n
	$\frac{x^{2}-4\pi^{2}+4\left(\cos x+\cos 2x+\cdots\right)-4\pi\left(\sin x+\sin 2x+\cdots\right)}{3}$
	put x=17, we get
V	12-412+4(cost + cos211+)-411 (0) - islnnn=0
3	$\frac{\Pi^2 - 4\Pi^2}{3} = 4\left(\frac{-1}{1^2} + \frac{1}{2^2} + \frac{-1}{3^2} - \dots\right)$
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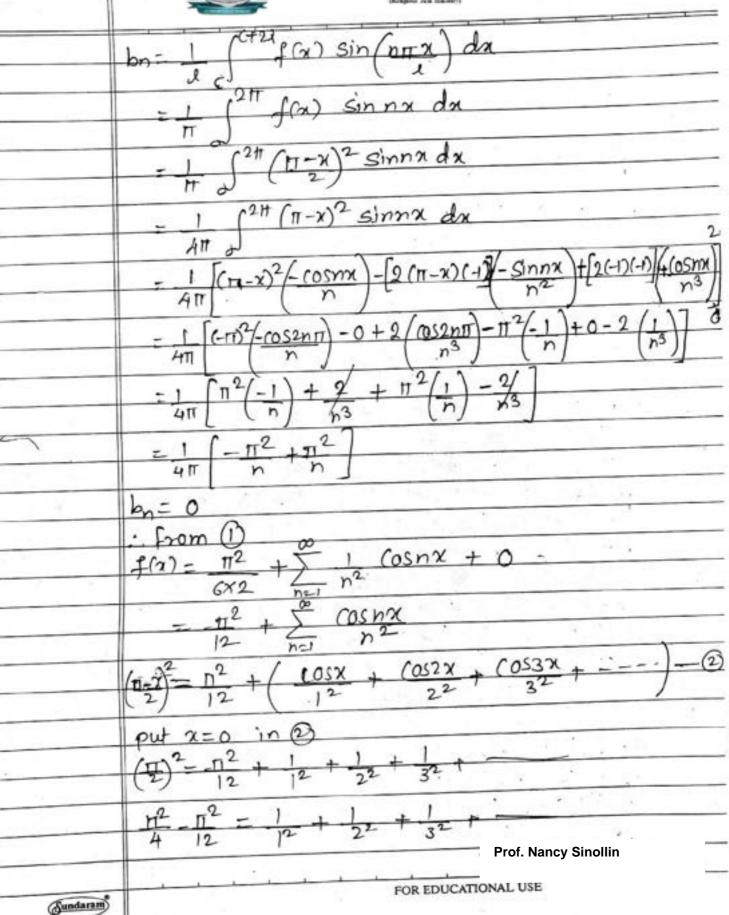


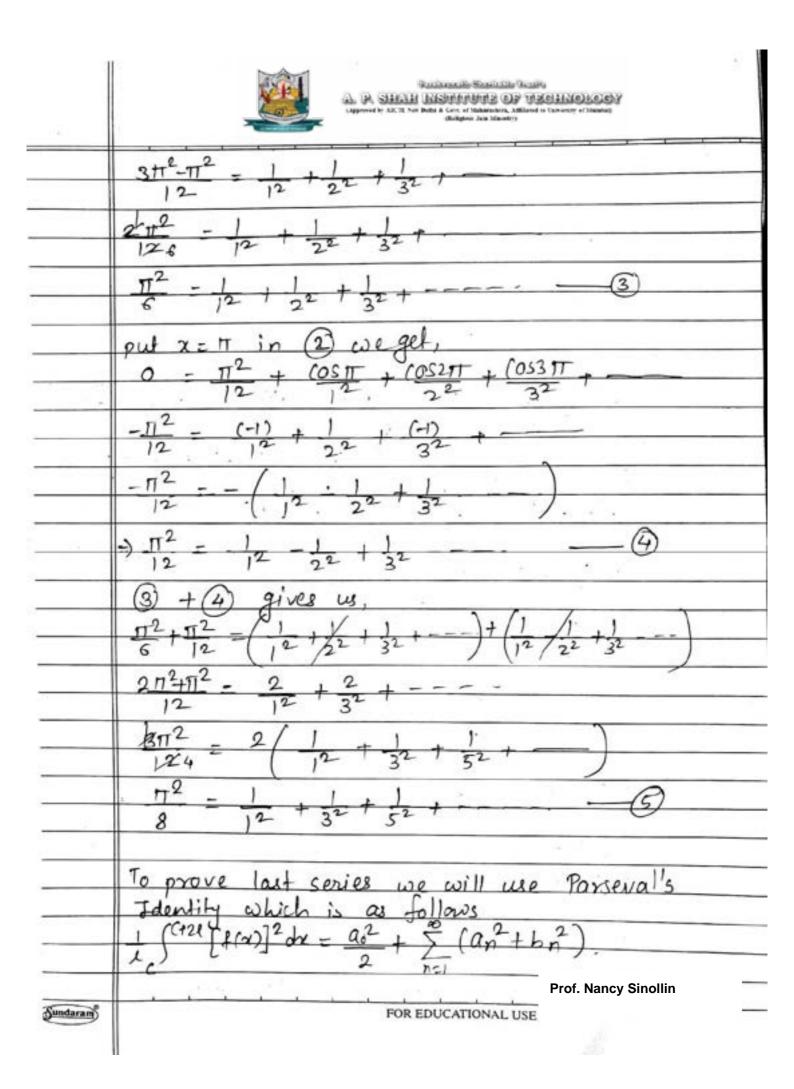
#### A. P. SHELL INSPECTURE OF TESTINOLOGY Opposed to ACT. Not Bobs & Gro. of Madericky, Affiliand to Taxonomy of Human

	$= \frac{1}{11\times40} \int_{0}^{2\pi} (\pi - x)^{2} dx$	
	$= 1 \int (\pi - x)^3 \int_{-2\pi}^{2\pi}$	
	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
	= 1 [2\pi^3] :4\pi [3]	
	= <u>m²</u> 6-	
	an = 1 SC+21 frx) cos (nox) dx	16
	$\frac{2n-1}{1}\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{f(x)}{f(x)} \cos\left(\frac{n\pi x}{2}\right) dx$	A
	$= \int_{4\pi}^{2\pi} (\pi - x)^2 \cos nx  dx$	1/4
	$= \frac{1}{4\pi} \left[ \frac{(\pi - x)^2 (\sin nx) - [2(\pi - x)(-1)] - (\cos nx)}{n} \right]$	-7
	+ [2(-1)(-1)] (-sinnx)	
	$= \frac{1}{4\pi} \left[ (-\pi)^{2}(0) - \left[ 2(-\pi)(-1) \right] \left( -\cos 2n\pi \right) + 0 \right]$	
	$-0 + 2(\pi)(-1)(-\cos(6)) - 0$	
	$\frac{-1}{4\pi}\left[\frac{2\pi}{n^2}+\frac{2\pi}{1}\frac{1}{n^2}\right]-\frac{1}{4\pi}\frac{4\pi}{n^2}$	
	$\alpha_n = \frac{1}{n^2}$ Prof. Nancy Sinollin	
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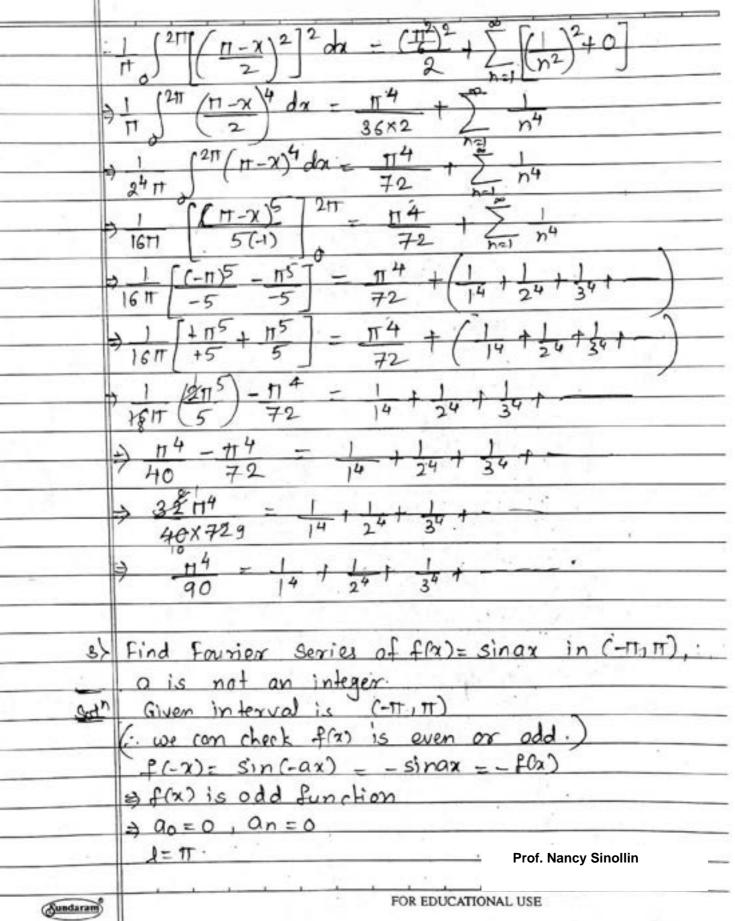
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#### A. P. SHALI INSPERENCE OF TRACHMOLOGY (Append by ALCE for Both & Core of Balancher, Affiliand to Taxoning of Disease)





### GLEGARALIS STREET STREET

	$f(a) = \sum_{n=1}^{\infty} b_n \sin(n\pi x)$
	nel (1)
	PCA T I AMERICA
	\$(0) = \( \sum_{\text{bn sinnx}} \)
-	Nel .
	$b_n = \frac{2}{\ell} \int_{-\ell}^{\ell} f(x) \sin(\frac{nnx}{\ell}) dx$
	- 2 (" sinon sinna da
	σ'
	$= \frac{2}{17} \times \frac{1}{2} \int_{-\infty}^{\infty} \left[ \cos \left( \alpha x - n x \right) - \cos \left( \alpha x + n x \right) \right] dx$
	H 20 L
	= 1 ("[cos(a-n)x - cos(a+n)x]dx.
	H L L
	- 1 [ sin (a now sin (a time) ] T
	$\frac{1}{\pi} \left[ \frac{\sin(0-n)\pi}{(a-n)} - \frac{\sin(a+n)\pi}{(a+n)} \right]^{\frac{\pi}{4}}$
	$= \frac{1}{\Pi} \left[ \frac{\sin(0-n)\pi}{(a-n)} - \frac{\sin(a+n)\pi}{a+n} - 0 + 0 \right] - n \neq a.$
	$=\frac{1}{n}\left[\frac{\sin(\alpha\pi-n\pi)}{(\alpha-n)}-\frac{\sin(\alpha\pi+n\pi)}{(\alpha+n)}\right]$
_	sin (art + not) = sinar (OSnIT + COSAIT SimIT
_	= Sinar (-1)" + 0=(-1)"Sinar
	:. bn = 1 (-1) sinatt - (-1) sinatt
-	L a-ri a+n
	- (-1) sinar [ ]
	H La-n atn
_	$= (4)^n \sin \alpha \tau \left[ \alpha + n - (\alpha - n) \right]$
	$\prod \qquad \qquad                                 $
	= (-1)n sinar 2n n + a
	$(a^2-n^2)$
	from 1 frx> = 52(-1) (sinati)n sinnx
	$\frac{1}{n=1}$ $(a^2-n^2)$
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