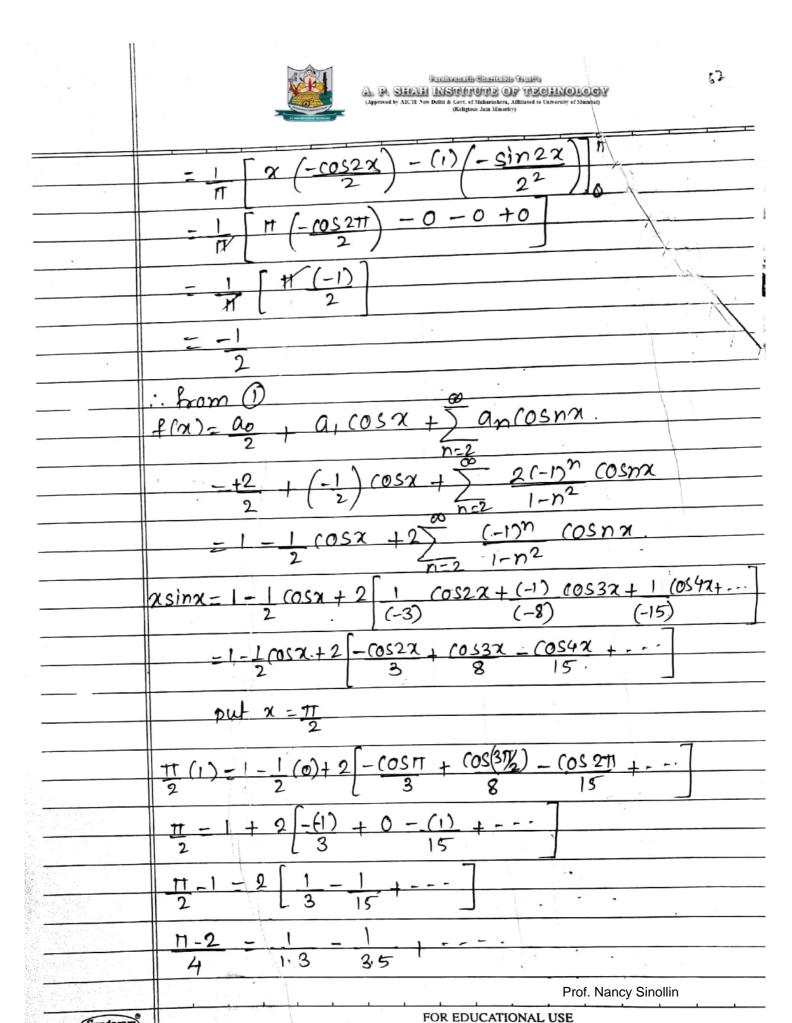


| 1 6 | ind fourier Series of f(a)= x sinx in (-11,11) |
|----------|---|
| 11) | ind + mirror series of 1-2-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1 |
| | reduce that, $71-2-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1$ |
| 2 10 | Given interval is (-11,11) which is symmetric |
| gan (| we'll there that the function is even orodd) |
| | $\frac{1}{7}(-x) = -x \sin(-x)$ |
| | $= (-x)(-\sin x)$ |
| | $= \alpha \sin \alpha$ |
| | -f(a) |
| | =) f(x) is even function |
| | - har o h Here; l=11 |
| | · las - an cos(nox) |
| | 2 1 2 |
| | $=\frac{a_0}{2} + \frac{n_0}{2} = a_n \cos n\alpha$ |
| | 2 hel |
| | ao-2 (lfa)dx |
| | o the acina da |
| | -2 st asina da |
| | $-2\left[x\left(-\cos x\right)-(1)\left(-\sin x\right)\right]^{\dagger\dagger}$ |
| | $\frac{-2}{\pi}$ $\left[\chi \left(-\cos\chi \right) - \left(1 \right) \left(-\sin\chi \right) \right]_{0}$ |
| | = 2 [T (-(OSH) - 0 - 0 + 0] |
| | 7 / (= (0311) 0 = 1 |
| - | - 2 (-rt (-1)] |
| | Fil J |
| | = . 2 |
| | $a = 2 \int_{-\infty}^{\infty} f(\alpha) \cos(n\pi x) dx$ |
| | 10) |
| | = 2 (" xsinx casnx dx. |
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| 5 1 | |
|---------|---|
| | $= 2 \int_{\pi} \frac{\pi}{2} \left[\sin(\alpha + n\alpha) + \sin(\alpha - n\alpha) \right] d\alpha$ |
| | = $\int_{T}^{t} \alpha \left[\sin(1+n)\alpha + \sin(1-n)\alpha \right] d\alpha$. |
| | $-\frac{1}{\pi} \left[\frac{1}{(1+n)^2} - \frac{(0)(1-n)^2}{(1-n)^2} - \frac{(1)}{(1+n)^2} \right]$ |
| 4 | $\frac{-\sin(1-n)^2}{(1-n)^2} = n + 1$ |
| | $\frac{-1 \left[\pi \left[-(os(1+n)\pi - (os(1-n)\pi) - [o - o] - o + o \right] \right]}{1+n}$ |
| | $\frac{\Pi}{\Pi} \left[\begin{array}{cccc} 1+n & 1-n \end{array} \right] \left[\begin{array}{cccc} -n \neq 1 \end{array} \right]$ |
| | $\frac{-1}{1+n} \frac{4}{1-n} \left[\frac{(-1)^{1+n}}{1-n} \right]$ |
| | $ (-1)(-1)^n$ $ (-1)(-1)^{-n}$ |
| | $= \frac{(-1)^n}{1+n} + \frac{(-1)^n}{1-n} \qquad \qquad (-1)^n = (-1)^{-n}$ |
| | = (-1) ⁿ 1 + 1 |
| | [1+n 1-n] |
| | $\left[1-n^2\right]$ |
| | $\frac{-(-1)^n 2}{1-n^2} - n \neq 1$ |
| | Now to find an for n=1 ie to find a, a, = 2 (1f(x) cosx dx |
| | = 2 1 T x sinx cosx dx. |
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| 12 | Find Fourier Series for f(x)11 -TI <x<0< th=""></x<0<> |
|----------|--|
| | |
| | Also deduce $\frac{\sqrt{2n-1}}{2n-1} = \frac{\sqrt{2n-1}}{8}$ |
| | $\frac{1}{n=1}(2n-1)^2$ 8 |
| Sal | Given interval is (-11, TT) i.e symmetric interval |
| | Hence we can check the function is even model |
| -1 | as f(-x)=5-++ -++ <-x <0 |
| | as $f(-x)=S-H$ $-H<-x<0$ -x $0<-x$ |
| | $=$ $S-\Pi$ $\pi t > \alpha > 0$ |
| | $= \begin{cases} -11 & 7t > x > 0 \\ -x & 0 > x > -11 \end{cases}$ |
| | + 1(x) |
| | alin f(-x) + -f(-x) |
| | $ \frac{1}{4} f(x) $ also $f(-x) \neq -f(x)$; $-f(x) = \begin{cases} -\pi & -\pi & < x < 0 \\ -x & o < x < n \end{cases}$ |
| 12 12 | · Charles I all |
| | : Given function is neither even nor odd. |
| | $(C, C+2l) = (-\Pi, \Pi)$ |
| | =) (=-H & (+2l=T) =) l=T |
| | 7(x)= do + 5 an cognor + 5 bn Sin (nox) |
| | $\frac{2}{2} \sum_{n=1}^{\infty} a_n \cos n\alpha + \sum_{n=1}^{\infty} b_n \sin n\alpha - 1$ |
| | $=\frac{a_0}{2}$ an cosnx + $\frac{1}{2}$ by sinnx - (1) |
| | nel hel |
| | ao - 1 (C+21 f(x) dx |
| | 1, |
| | $=1 (f(\alpha) d\alpha$ |
| | М _п) |
| | = 1 [((-11) dx + ("x dx] |
| | $\overline{\Pi}$ |
| | $-1 \left(\left(-H \right) \left(\alpha \right) \right) + \left(\alpha^{2} \right)^{H} $ |
| 30 | $\frac{1}{1}$ |
| | - 1 ((T)(0 (T)) + H27 |
| | 1 (-11)(0-(-11)) + 11- |
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| | at expressibility in Commands |
|----------|---|
| | |
| | $= \frac{1}{\pi} \left[-\frac{\pi^2 + \Pi^2}{2} \right]$ |
| - | |
| 1 28 | |
| | $-1\left(-\Pi^{\cancel{2}}\right)$ |
| | ति [2] |
| | T |
| | 2 |
| | |
| | an = 1 (C+21 f(x) cos(nIIX) dx |
| | |
| | -1 ("f(x) cosna da |
| | MT / |
| | - 1 ((-11) cosna da + (" 2 cosna da |
| | = 1 (-11)(U311X VIX) |
| | $\frac{1}{2} \left[\frac{1}{2} \left(\frac{1}{2} \left(\frac{1}{2} \right) - \frac{1}{2} \left(\frac{1}{2} \right) \right] \right]$ |
| | $= \frac{1}{(-\pi)} \left[\frac{\sin nx}{\sin nx} \right] + \left[\frac{x}{x} \left(\frac{\sin nx}{nx} \right) - \frac{1}{(-\cos nx)} \right]$ |
| | |
| | $-1 \left[(-11) (0-0) + \left[11 (0) + \cos n\pi \right] - 0 + (-1) \right]$ |
| 3 | $= \frac{1}{n^2} \left[(-17)(0-0) + \left[\frac{17}{n^2} (0) + \frac{(-1)}{n^2} \right] \right]$ |
| | -1 [(-1) ⁿ -1] |
| | $\frac{1}{\pi} \frac{(-1)^n - 1}{n^2}$ |
| | " |
| | ba-1 ((+21 fax) sin (nox) da |
| | 2 (2) |
| | - 1 (# fm) sin nx dx |
| | # - / '/ |
| 1 | T (O CT) sinnadat ("a sinna da |
| , An. 1 | (-11/3/11/10/11) |
| | TT [-17] |
| | $-1 \left[(-n) \left[-\cos n\alpha \right]^{\circ} + \left[\alpha \left(-\cos n\alpha \right) - (1) \left(-\sin n\alpha \right) \right]$ |
| | \parallel σ |
| | $-1 \left(\frac{1}{-11} \right) \left[\frac{1}{-11} + \frac{1}{-$ |
| | $\frac{1}{n} \left(\frac{-n}{n} \right) = \frac{1}{n} \left(\frac{-n}{n}$ |
| | |
| | $= 1 \int + \prod - \pi \cos n\pi - \pi \cos n\pi$ |
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| L | |
|----------|--|
| | $-\frac{11}{17} \left[\frac{1}{n} - 2 \cos n \right]$ |
| | |
| | $= \frac{1-2(-1)^n}{n}$ |
| | from (1) |
| | $len = -tt + \sum_{n=1}^{\infty} \left(l_{-1} \sum_{n=1}^{\infty} l_{$ |
| | $f(n) = -\pi + \sum_{n=1}^{\infty} \frac{1}{1!} \left(\frac{(-1)^n}{n^2} \right) (osnx + \sum_{n=1}^{\infty} \frac{(1-2(-1)^n)}{n} sinm$ |
| | $f(x) = -\frac{\pi}{4} + \frac{1}{\pi} \sum_{n=1}^{\infty} \frac{(-1)^n - 1}{n^2} \cos nx + \sum_{n=1}^{\infty} \frac{1 - 2(-1)^n}{n} \sin nx$ |
| | $\frac{1}{4}$ $\frac{1}{1}$ $\frac{1}$ |
| | put x = 0 |
| | $f(0) = -\frac{11}{4} + \frac{1}{11} \sum_{n=1}^{\infty} \frac{(-1)^n - 1}{n^2} (1) + 0$ |
| | $\frac{4}{n}$ $\frac{\pi}{n}$ $\frac{\pi}{n}$ |
| - | $f(0) = \frac{1}{2} \left[\lim_{x \to 0^{-}} f(x) + \lim_{x \to 0^{+}} f(x) \right]$ |
| | |
| | - 1 [lim (-ti) + lim 2] 2 [2170- 2170+] |
| | |
| | = -17 |
| | |
| | $\frac{11-17}{2} = -\frac{17}{4} + \frac{1}{17} \left[\frac{(-2)}{1^2} + 0 + \frac{(-2)}{3^2} + 0 \frac{1}{3^2} \right]$ |
| | 2 TT TT - [-2] [] 7 |
| • | 4 2 H 12 + 32 + |
| | Э-П v П - 1 - 1 |
| | 4 (-2) 12 + 32 + |
| 71 | $\rightarrow H^2 - 1$ |
| r +36 | 8 12 + 32 + |
| | $\Rightarrow \Pi^2 - \Rightarrow 1 - (2n-1)$ is odd number. |
| | $\frac{8}{n=1} (2n-1)^2$ |
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| - | Find Fourier Series of f(a)- sima in (-11,11) |
|-------------|--|
| 1.3 | Since given interval is (-11/11) i.e symmetric |
| <u>s</u> dh | Since given interval is even or odd |
| 2 | we'll check the function is even or odd |
| | $\frac{we' }{f(-x)} = \frac{ \sin(-x) }{ \sin(-x) } = \frac{ \sin x }{ \sin(-x) } = \frac{ \sin x }{ \sin(-x) }$ |
| | =) Given function is even function |
| | l a here lett |
| | : fla) = ao + 5 an cos (nox) |
| | $\frac{\Rightarrow bn = 0}{\therefore f(x) = a_0} + \sum_{n=1}^{\infty} a_n \cos(n\pi x)$ $\frac{\Rightarrow bn = 0}{\Rightarrow a_n \cos(n\pi x)}$ $\frac{\Rightarrow a_n = 0}{\Rightarrow a_n \cos(n\pi x)}$ |
| | $\frac{a_0}{2}$, $\frac{a_0}{2}$ an cosnx — (1) |
| | 7. " no! |
| 2. | a = 2 (l f(x) dx |
| 9 | $a_0 = 2 \int_{a}^{b} f(x) dx$ |
| | o c^{π} $f(\alpha)$ $d\alpha$ |
| | $-\frac{2}{\pi}\int_{0}^{\pi}f(x)dx$ |
| | Lead - Isinal -1-cacti |
| | (6) n α - 12 x $=3$ |
| | + sin x 0 < x < p |
| | |
| | |
| | a Cocy Th |
| | $= 2 \left[-\cos x\right]^{\frac{1}{1}}$ |
| | |
| | $= \frac{2}{\pi} \left[-\cos \pi + 1 \right]$ |
| - | C |
| - L | -2 (-(-1)+1) |
| | II L |
| | = 4 |
| | Π . |
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| 1 11 | |
|--------|--|
| | $a_n = 2 \int_{\mathcal{A}} f(x) \cos(n\pi x) dx$ |
| | |
| | $= 2 \int_{\Pi} \sin x \cos nx dx$ |
| | π |
| | $-\frac{2}{\pi}\int_{2}^{\pi}\left[\sin\left(x+nx\right)+\sin\left(x-nx\right)\right]dx$ |
| | ~ 1 CT C 1 2 2 2 7 1 |
| | $-\frac{2}{\pi} \int_{-\pi}^{\pi} \left[\sin(1+n)x + \sin(1-n)x \right] dx$ |
| | $= \frac{1}{\Pi} \left[\frac{-\cos(1+n)x}{1+n} - \frac{\cos(1-n)x}{1-n} \right] \frac{n+1}{1-n}$ |
| | |
| | $-\frac{1}{\pi} \left[-\frac{(os(1+n)\pi - \cos(1-n)\pi + 1}{1+n} + \frac{1}{1-n} \right]$ |
| | |
| | $=\frac{1}{1+n}\left[\frac{-(-1)^{1+n}}{1+n}-\frac{(-1)^{1-n}}{1-n}+\frac{1}{1+n}+\frac{1}{1-n}\right]$ |
| | = 1 [-(-1)(-1) ^m - (-1)(-1) ⁻ⁿ + 1 + 1 |
| 18. | IT 1+n 1-n 1+n 1-n |
| | $=\frac{1}{\pi}\left[\frac{(-1)^{n}}{1+n}+\frac{(-1)^{n}}{1-n}+\frac{1-n+1+n}{1-n^{2}}-\frac{(-1)^{-n}}{1-n^{2}}=(-1)^{n}$ |
| | |
| | $=\frac{1}{\Pi}\left[\frac{(-1)^{n}\left(\frac{1}{1+n}+\frac{1}{1-n^{2}}\right)}{1-n^{2}}\right]$ |
| | $-1 \left((-1)^{n} 2 + 2 \right)$ |
| 1 | $\prod \left[1-h^2 \right] -h^2$ |
| | $= 2 \left[1 + (-1)^m \right] \qquad n \neq 1$ |
| | $\prod \left[1-n^2 \right]$ |
| A | How to find an for n=1 |
| | : a, = 2 (f (x) cos fix) dx |
| | |
| | = 2 ("sinx cosx dx |
| | T) |
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| And the Special consistency of the Special Spe | = 2 ft sin2x dx |
|--|--|
| | 0 |
| | $=\frac{1}{H}\int_{-\infty}^{\infty}\frac{1}{2}dx$ |
| | H L 2 Jo |
| | $\frac{1}{\pi} \left[-\frac{\cos 2\pi}{2} + \frac{1}{2} \right]$ |
| = | T 2 2] |
| | = 1 (-1 + 1) |
| | π[2 2] |
| | - 0 |
| | : from (1) |
| | $f(x) = a_0 + a_1 \cos x + \sum a_n \cos nx$ |
| | h=2 |
| | $\frac{-4^{2}}{11 \times 2} + 0 + \frac{\infty}{100} \frac{2}{11} \left[\frac{1 + (-1)^{n}}{1 - n^{2}} \right] \cos nx$ |
| | # x2 1 [1-n2] |
| | <i>∞ ∧</i> |
| | $= \frac{2}{11} + \frac{2}{11} \sum_{n=2}^{\infty} \frac{1 + (+)^n}{1 - n^2} Cosn x$ |
| | $\prod \frac{1}{n-2} \left(1-n^2\right)$ |
| | y · · · · · · · · · · · · · · · · · · · |
| 14) | EX. |
| , | Find Empier series of f(x)=) 0 -5(x20) |
| | (3 06,769 |
| | Hint: Given function is neither even nor odd. |
| | |
| 15> | Ex. |
| | Find Fourier semies of f(x)= 2 -2 <x<0< th=""></x<0<> |
| | |
| | Hinti As interval is (-2,2) but given function is |
| | neither even nor odd. |
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| 16 | Ex: |
|----------|--|
| | Find Fourier Series of fran- 1x1 in (-1,1) |
| | Hint + f(x)=1x) is even function |
| | Also $f(x) = x $ (-1,1) |
| | - S-x -1 < x < 0 |
| | \(\frac{1}{2}\) |
| 17) | fx: |
| | Find Fourier series of f(x)= SITX OCXCI |
| | (0) 121(2 |
| اهد | $C: L \subseteq \mathbb{R}$ |
| <u> </u> | Find Faurier Series of $f(x) = 3x^2 - 6x\pi + 2\pi^2$ |
| | in (0.20) also deduce π^2 |
| 31 | in (0,211) also deduce 112 - 12 + 122 + 32 + |
| san | $(C,C+2R)=(0,2\Pi)$ |
| | =) C=0 & (+2l=21 +) l=1. |
| | 1(x) = ao 5 an (os(nTX) + 5 bnsin (nTX) |
| | $f(x) = a_0 + \sum_{n=1}^{\infty} a_n \cos(n\pi x) + \sum_{n=1}^{\infty} b_n \sin(n\pi x)$ |
| | = an cosnx + bn sinnx |
| | 2 hel hel |
| -, | Qo = 1 (C+21 f(x) dx |
| | (27) (0, 2, 0, 1, 1, 2) A |
| | $= \frac{1}{\pi} \left(\frac{277}{3x^2 - 6x} + 2\pi^2 \right) dx$ |
| | 12) |
| | $= \int_{-\infty}^{2\pi} (3x^2 - 6x\pi + 2\pi^2) dx$ |
| | (2 T) |
| | $= \frac{1}{12\pi} \left \frac{3x^3}{3} - \frac{8x^2\pi}{2} + \frac{2\pi^2x}{2} \right ^{2\pi}$ |
| | $= 1 \left[8\pi^3 - 12\pi^3 + 8\pi^3 - 0 \right] - 0$ |
| | |
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| | of any section of the contraction of the contractio |
|-----------------|--|
| , | |
| | $a_0 - 0$ |
| | a_{n-1} (c+2l $f(x)$ cos($n\pi x$) dx |
| | |
| | = 1 (211/3x2-6x11+2112) cosnx dx |
| | $\frac{1}{17}$ $\frac{3x-8}{12}$ |
| | $\frac{1}{1} \left(\frac{2H}{3x^2 - 6xH} + \frac{2H^2}{2H^2} \right) \cos nx dx$ |
| | 10 11 (37-6711+211) (03112 511 |
| | $\frac{12\pi}{5}$ |
| | $= \frac{1}{12\pi} \left[(3x^2 - 6x\pi + 2\pi^2) \left(\frac{\sin nx}{n} \right) - (6x - 6\pi) \left(\frac{\cos nx}{n^2} \right) \right]$ |
| | 17.41 |
| | $+6\left(-\sin n^{2}\right)$ |
| - | |
| | $(2\pi-6\pi)(-1000000000000000000000000000000000000$ |
| | $-\frac{1}{12\pi} \left[0 - \left(12\pi - 6\pi\right) \left(-\cos 2n\pi\right) + 0 - 0 + \left(-6\pi\right) \left(-1\right) - 0 \right]$ |
| | |
| | $\frac{-1 \left[\frac{6H}{n^2} + \frac{6\Pi}{n^2}\right] - 1 \left[\frac{12H}{n^2}\right]}{12\Pi \left[\frac{n^2}{n^2}\right]}$ |
| | 1/211 [1/2 1] |
| | $a_n = \frac{1}{a_n}$ |
| | n ² |
| | bn = 1 (C+21 frx) sin(nIX) dx |
| | |
| | $-1 \int_{0.00000000000000000000000000000000000$ |
| | $\frac{1}{\pi}$ |
| | -1 ($3x^2-6x\pi+2\pi^2$) sinna dx |
| | |
| , | 1217 |
| | $\frac{1}{12\pi} \left(3\chi^{2} - 6\chi\pi + 2\pi^{2} \right) \left(-\cos m\chi \right) - \left(6\chi - 6\pi \right) - \sin n\chi $ |
| | 7 27 |
| | $+6\left(\frac{\cos nx}{n^3}\right)$ |
| 9 1 Se V. A | $\binom{n^2}{}$ |
| | $-1\left[\left(12\pi^{2}-12\pi^{2}+2\pi^{2}\right)\left(-\cos 2\pi\pi\right)-0+6\cos 2\pi\pi-2\pi^{2}-1\right]+0-6$ |
| | $\frac{1}{2\pi}$ |
| | |
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| E | $b_n = 1$ $\left[-2\pi^2 + \frac{6}{n^3} + 2\pi^2 - \frac{6}{n^3} \right]$ |
|----------|--|
| | |
| 7 | = 1 (0) 12TT |
| | bn=0 |
| | i. from (1) |
| | $f(x) - 0 + \sum_{i=1}^{\infty} 1 \cos nx + 0$ |
| | $f(x) = 0 + \sum_{n=1}^{\infty} \frac{1}{n^2} \cos nx + 0$ |
| | $= \frac{\cos x + \cos 2x + \cos 3x}{1^2 + 2^2} + \frac{\cos 3x}{3^2} + \dots$ |
| | $3x^{2}-6x\pi+2n^{2}=\cos x+\cos 2x+\cos 3x+\cdots$ |
| | |
| | put 2=0 |
| | $\frac{put \ z=0}{12.6}$ $\frac{12.6}{12.6} = \frac{1}{12} + \frac{1}{2^2} + \frac{1}{3^2} + \cdots = \frac{1}{3^2}$ |
| | 472 1 1 1 |
| | $\frac{126}{12} - \frac{1}{12} + \frac{1}{2^2} + \frac{1}{3^2} + \cdots$ |
| | |
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