



TUTORIAL 6

Problems based on Parsevals and Harmonic Analysis

1. Find the half range cosine series of $f(x) = x(\pi - x)$ in $(0, \pi)$ hence find

$$\frac{1}{1^4} + \frac{1}{2^4} + \frac{1}{3^4} + \frac{1}{4^4} + \dots = \frac{\pi^4}{90}$$

2. Find the first two harmonic of the Fourier series for $f(x)$ from the following data.

x	0	$\frac{\pi}{3}$	$\frac{2\pi}{3}$	π	$\frac{4\pi}{3}$	$\frac{5\pi}{3}$	2π
y	1	1.4	1.9	1.7	1.5	1.2	1

3. Find the first two harmonic of the Fourier series for $f(x)$ from the following data.

x	0	1	2	3	4	5
y	9	18	24	28	26	20