Deadline Wednesday, October 31.

APM 346 (2012) Home Assignment 5

Some of the problems in this assignment could be solved based on the other problems and such solutions are much shorter than from the scratch; seeing and exploiting connections is a plus.
Here $\mathbb{N} =$
$1, 2, 3, \ldots,$

Problem 1   Decompose into full Fourier series on interval $[-l, l]$:

(a) e^{zx} where $z \in \mathbb{C}$; find "exceptional" values of z;

(b) $\cos(\omega x)$, $\sin(\omega x)$ where $0 < \omega \in \mathbb{R}$; fins "exceptional" values of ω;

(c) $\cosh(\eta x)$, $\sinh(\eta x)$ where $0 < \eta \in \mathbb{R}$.

Problem 2   Decompose into full Fourier series on interval $[-l, l]$ and sketch the graph of the sum of such Fourier series:

(a) x;

(b) $|x|$;

(c) x^2.

Problem 3   Decompose into full Fourier series on interval $[-\pi, \pi]$ and sketch the graph of the sum of such Fourier series:

(a) $|\sin(x)|$;

(b) $|\cos(x)|$.

Problem 4 Decompose into sin Fourier series on interval $[0, \pi]$ and sketch the graph of the sum of such Fourier series:

(a) 1;

(b) x;

(c) $\sin(mx)$ with $m \in \mathbb{N}$;

(d) $\cos(mx)$ with $m \in \mathbb{N}$;

(e) $\sin((m - \frac{1}{2})x)$ with $m \in \mathbb{N}$.

Problem 5 Decompose into sin Fourier series on interval $[0, \pi]$ and sketch the graph of the sum of such Fourier series:

(a) 1;

(b) x;

(c) $\sin(mx)$ with $m \in \mathbb{N}$;

(d) $\cos(mx)$ with $m \in \mathbb{N}$;

(e) $\sin((m - \frac{1}{2})x)$ with $m \in \mathbb{N}$.

Problem 6 Decompose into Fourier series with respect to $\sin((n + \frac{1}{2})x)$ $(n = 0, 1, \ldots)$ on interval $[0, 2\pi]$ and sketch the graph of the sum of such Fourier series:

(a) 1;

(b) x;

(c) $\sin(mx)$ with $m \in \mathbb{N}$;

(d) $\cos(mx)$ with $m \in \mathbb{N}$;

(e) $\sin((m - \frac{1}{2})x)$ with $m \in \mathbb{N}$.