

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 $\mathbb{N} =$
 $1, 2, 3, \dots,$

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 $0 < \omega \in \mathbb{R}$; find “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 cos 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 $\sin((n + \frac{1}{2})x)$ ($n = 0, 1, \dots$) 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 $m \in \mathbb{N}$.