Home work. Part 2[1].

1. (a) Find the sum

$$\sum_{n=1}^{\infty} \frac{1}{n} e^{in\theta}$$

(by using Taylor expansion of some known function - write $z = e^{i\theta}$ check the table of Taylor expansions) and prove that the series is $L^2(-\pi, \pi)$-convergent but not point-wise convergent.

(b) For which $p > 0$ is the series

$$\sum_{n=1}^{\infty} \frac{1}{n^p} e^{i\theta}$$

L^2-convergent?

2. Which of the following Sturm-Liouville problems on $[0, \pi]$ is regular? Solve then the regular problem

(a) $f'' + \lambda f = 0$, $f(0) = 0$, $f'(0) = 0$.

(b) $f'' + \lambda f = 0$, $f(0) = 0$, $f'(\pi) = 0$.

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[1]The deadline for submitting this home work is Monday, Sept 26