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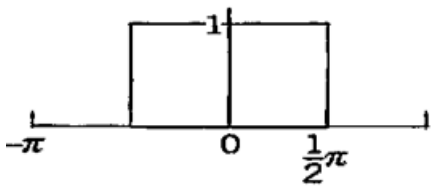
MODULE 5-FOURIER SERIES
TUTORIAL SHEET 1

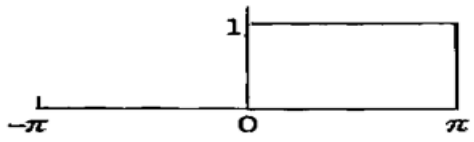
Question set 1:

Find the Fourier series expansion of the function with period 2π

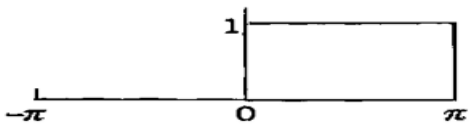
a)



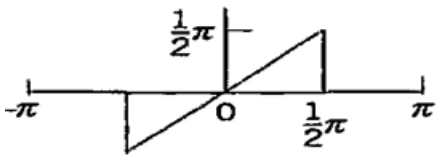
b)



c)



d)



e)

$$f(x) = \begin{cases} x^2 & \text{if } -\frac{1}{2}\pi < x < \frac{1}{2}\pi \\ \frac{1}{4}\pi^2 & \text{if } \frac{1}{2}\pi < x < \frac{3}{2}\pi \end{cases}$$

f)

$$f(x) = \begin{cases} -4x & \text{if } -\pi < x < 0 \\ 4x & \text{if } 0 < x < \pi \end{cases}$$

Question set 2:

Find the Fourier series expansion of the function f(x) with period $p = 2l$

1. $f(x) = -1\ (-2 < x < 0),\ f(x) = 1\ (0 < x < 2),\ p = 4$
2. $f(x) = 0\ (-2 < x < 0),\ f(x) = 4\ (0 < x < 2),\ p = 4$
3. $f(x) = x^2 \quad (-1 < x < 1), \quad p = 2$
4. $f(x) = \pi x^3/2 \quad (-1 < x < 1), \quad p = 2$
5. $f(x) = \sin \pi x \quad (0 < x < 1), \quad p = 1$
6. $f(x) = \cos \pi x \quad (-\frac{1}{2} < x < \frac{1}{2}), \quad p = 1$
7. $f(x) = |x| \quad (-1 < x < 1), \quad p = 2$
8. $f(x) = \begin{cases} 1 + x \text{ if } -1 < x < 0 \\ 1 - x \text{ if } \quad 0 < x < 1, \end{cases} \quad p = 2$
9. $f(x) = 1 - x^2 \quad (-1 < x < 1), \quad p = 2$
10. $f(x) = 0\ (-2 < x < 0),\ f(x) = x\ (0 < x < 2),\ p = 4$