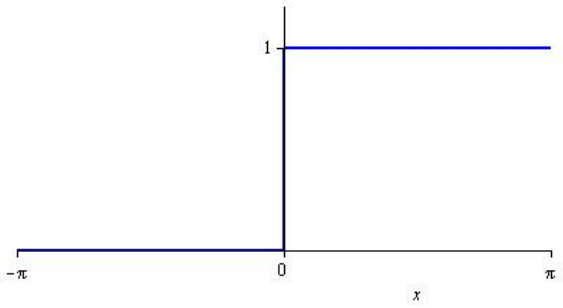
Norges teknisk–naturvitenskapelige
universitet
Institutt for matematiske fag

TMA4120
Matematikk 4K
H2009

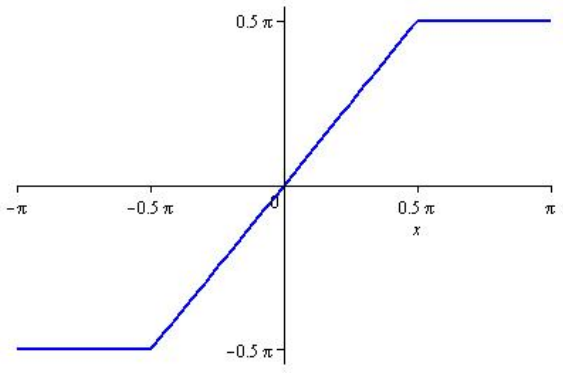
Øving 3

Oppgavene er hentet fra Erwin Kreyszigs «Advanced Engineering Mathematics», 9. utgave.

1 (K9 11.1:14)
Find the Fourier series of $f(x)$ given in the figure, which is assumed to have period 2π. Sketch or graph the partial sums up to that including $\cos 5x$ and $\sin 5x$.



2 (K9 11.1:20)
Find the Fourier series of $f(x)$ given in the figure, which is assumed to have period 2π. Sketch or graph the partial sums up to that including $\cos 5x$ and $\sin 5x$.



3 (K9 11.1:21)
Find the Fourier series of $f(x) = x^2 \quad (-\pi < x < \pi)$, which is assumed to have period 2π. Sketch or graph the partial sums up to that including $\cos 5x$ and $\sin 5x$.

4 (K9 11.2:8)
Find the Fourier series of

$$f(x) = \begin{cases} 1+x & \text{if } -1 < x < 0 \\ 1-x & \text{if } 0 < x < 1, \end{cases} \qquad p = 2L = 2.$$

And sketch or graph the first three partial sums.

5 (K9 11.3:11)
Is the function $f(x) = \pi - x \quad (-\pi < x < \pi)$ even or odd? Find its Fourier series. Sketch or graph the function and some partial sums.

6 (K9 11.3:14)
Is the function

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

even or odd? Find its Fourier series. Sketch or graph the function and some partial sums.

7 (K9 11.5:9)
Find a general solution to the ODE

$$y'' + \omega^2 y = r(t)$$

where

$$r(t) = \begin{cases} t+\pi & \text{if } -\pi < t < 0 \\ -t+\pi & \text{if } 0 < t < \pi \end{cases}$$

and $r(t + 2\pi) = r(t)$