Norwegian University of Science
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Institutt for matematiske fag

TMA4123 / TMA4125
Matematikk 4M/N
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Exercise set 3

Kreyzsig (8th ed): 12.2.2 Represent the following in polar form and plot in the complex plane (showing the details of your work):

$$-2 + 2i$$

Kreyzsig (8th ed): 12.2.7 Represent the following in polar form and plot in the complex plane (showing the details of your work):

$$\left(\frac{6+8i}{4-3i}\right)^2$$

Kreyzsig (8th ed): 12.2.9 Represent the following in polar form and plot in the complex plane (showing the details of your work):

$$\frac{2+i}{5-3i}$$

Kreyzsig (8th ed): 12.2.18 Represent the following in the form $x + iy$ and plot in the complex plane:

$$6(\cos\frac{\pi}{3} + i\sin\frac{\pi}{3})$$

Kreyzsig (8th ed): 10.5.5 Find the complex Fourier series in the following function. (Show the details of your work.)

$$f(x) = x, \quad 0 < x < 2\pi$$

Kreyzsig (8th ed): 10.5.6 Find the complex Fourier series in the following function. (Show the details of your work.)

$$f(x) = x^2, \quad -\pi < x < \pi$$

Kreyzsig (8th ed): 10.5.7 Show that the complex Fourier coefficients of an even function are real and those of an odd function are pure imaginary.

8 Define complex Fourier series for functions of period $2L$ and write formulas for their coefficients.

Kreyzsig (8th ed): 10.7.7 In each case find the function $F(x)$ of the form

$$F(x) = A_0 + \sum_{n=1}^{N} (A_n \cos nx + B_n \sin nx)$$

for which the total square error E on the interval $-\pi \leq x \leq \pi$ is minimum and compute this minimum value for $N = 1, 2, ..., 5$, where, for $-\pi < x < \pi$

$$f(x) = \begin{cases} x & \text{if} \quad -\pi/2 < x < \pi/2 \\ 0 & \text{if} \quad \text{elsewhere in } -\pi < x < \pi \end{cases}$$

Kreyzsig (8th ed): 10.7.12 Using Parseval's identity, prove the following and compute the first partial sums to see that the convergence is rapid. (Use problem 10.2.13).

$$1 + \frac{1}{9} + \frac{1}{25} + ... = \frac{\pi^2}{8}$$