Norges teknisk–naturvitenskapelige universitet
Institutt for matematiske fag

TMA4120 Matematikk 4K H2009

Øving 7

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

1 (K9 13.2:7)
Represent $\frac{-6+5i}{3i}$ in polar form and graph it in the complex plane.

2 (K9 13.2:24)
Find and graph all roots of $\sqrt[3]{3+4i}$ in the complex plane.

3 (K9 13.2:30)
Solve and graph all solutions of $z^4+16=0$. Then use the solutions to factor z^4+16 into quadratic factors with *real* coefficients,

4 (K9 13.2:33)
Prove the parallellogram equality

$$|z_1+z_2|^2+|z_1-z_2|^2=2(|z_1|^2+|z_2|^2).$$

Explain the name.

5 (K9 13.3:2)
Find and sketch or graph the set in the complex plane given by

$$1\leq|z-1+4i|\leq 5$$

6 (K9 13.3:15)
Find Re f and Im f when $f=\frac{1}{z^2}$ Also find Re f and Im f evaluated at $z=1+i$.

7 (K9 13.3:21)
Differentiate $(z^3+i)^2$.

8 (K9 13.3:26f)
Show that $f(z)=|z|^2$ is differentiable only at $z=0$; hence it is nowhere analytic.

9 (K9 13.4:7)
Is $f(z) = \text{Re } z + \text{Im } z$ analytic?

10 (K9 13.4:10)
Is $f(z) = z^2 + \frac{1}{z^2}$ analytic?