NUST School of Electrical Engineering & Computer Science

MATH 232 - Complex Variables & transforms - BEE 6CD - Problem Sheet No. 01

Fall 2015 Semester 10-09-2015

Q-1. Write the number in the form $a+ib$.

(a) $\left[\frac{2+i}{6i-(1-2i)}\right]^2$ (b) $\frac{1}{1-i}+\frac{1}{1+i}+\frac{5}{1+2i}$.

Q-2. Reduce the following expressions in the polar form, giving only the principal value of the angle.

(a) $\frac{-1-i}{\sqrt{3}+i}$ (b) $\frac{(-1-i)\left(\frac{1}{\sqrt{2}}+i\frac{1}{\sqrt{2}}\right)}{(\sqrt{3}+i)^2}$ (c) $\frac{\left(\cos\frac{2\pi}{3}+i\sin\frac{2\pi}{3}\right)^3}{\left[\cos\left(\frac{-2\pi}{3}\right)+i\sin\left(\frac{-2\pi}{3}\right)\right]^2}$

Q-3. The complex numbers z_1 and z_2 satisfy the system of equations

$(1-i)z_1+3z_2=2-3i$, Find z_1, z_2.

$iz_1+(1+2i)z_2=1$.

Q-4 Describe the set of points z in the Complex plane that satisfy each of the following.

(a) $|z-1+2i|=3$ (b) $|z-1|+|z+1|=7$

(c) $|z|=3|z-1|$ (d) $\mathrm{Re}\,z=\mathrm{Im}\,z+5$

Q-5 Find all values of the following:

(a) $(1-\sqrt{3}i)^{1/3}$ (b) $\left(\frac{2i}{1+i}\right)^{1/6}$.

Q-6. Solve each of the following equations:

(a) $z^2-2z+i=0$ (b) $z^2-(3-2i)z+1-3i=0$.