TUTORIAL 2. COMPLEX NUMBERS 2

2.1. Calculate:

(a) $\sqrt[3]{(1+i)^6}$ (b) $\left(\frac{1-i}{1+i}\right)^{222}$

(c) $\left(\frac{1}{2}+i\frac{\sqrt{3}}{2}\right)^{124}$ (d) $\left(\frac{2+2i}{\sqrt{3}-i}\right)^{8}$

(e) $\sqrt[6]{1}$ (f) $\sqrt[4]{-1}$

(g) $\sqrt[4]{(3-5i)^4}$ (i) $\sqrt[6]{-i}$

2.2. Use de Moivre Law to

(a)express $\sin 5\alpha$ in terms of $\sin\alpha$ and $\cos\alpha$,

(b)express $\cos 4\alpha$ in terms of $\sin\alpha$ and $\cos\alpha$.

2.3. Prove that $\frac{\cos\alpha + i\sin\alpha}{\cos\beta + i\sin\beta} = \cos(\alpha-\beta) + i\sin(\alpha-\beta)$.

2.4. Find the polar form of

(a) $2+\sqrt{2}+i\sqrt{2}$ (b) $2+i+i\sqrt{3}$

2.5. Calculate

(a) $\cos\frac{\pi}{12}$ (b) $\cos 105^\circ$

(c) $\sin 75^\circ$ (d) $\sin(-15^\circ)$

2.6. Solve equations

(a) $x^2+x+1=0$ (b) $2x^2+ix+3=0$