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DEPARTMENT: MBBS

COLLEGE: MHS

COURSE: MAT 101

(1.) Z2-Z+1=0

 a=1, b=-1, c=1

i.

 Z$=\frac{-b\pm \sqrt{b^{2}-4ac}}{2a}$

 Z$=\frac{-(-1)\pm \sqrt{(-1)^{2}-4\left(1\right)(1)}}{2(1)}$ $=\frac{1\pm \sqrt{1-4}}{2}$

 Z$=\frac{1\pm \sqrt{-3}}{2}$ $=\frac{1\pm \sqrt{3\*-1}}{2}$ $=\frac{1\pm \sqrt{3}i}{2}$

 Z1 $=\frac{1+\sqrt{3}i}{2}$ & Z2 $=\frac{1-\sqrt{3}i}{2}$

ii.

For Z1 |Z1|=$\sqrt{\left(\frac{1}{2}\right)^{2}+\left(\frac{\sqrt{3}}{2}\right)^{2}}$ = $\sqrt{\frac{1}{4}+\frac{3}{4}}$ =

 = $\sqrt{\frac{4}{4}}$ =$ \sqrt{1}$ =1

Tanθ1=$\left(\frac{y}{x}\right)$

Tanθ1=$\left(\frac{\sqrt{3}}{2}÷\frac{1}{2}\right)$=$\sqrt{3}$

θ1=Tan-1($\sqrt{3}$ )=60o

For Z2 |Z2|=$\sqrt{\left(\frac{1}{2}\right)^{2}+\left(\frac{-\sqrt{3}}{2}\right)^{2}}$ = $\sqrt{\frac{1}{4}+\frac{3}{4}}$ =

 = $\sqrt{\frac{4}{4}}$ =$ \sqrt{1}$ =1

Tanθ2=$\left(\frac{y}{x}\right)$

Tanθ2=$\left(\frac{-\sqrt{3}}{2}÷\frac{1}{2}\right)$= $-\sqrt{3}$

θ1=Tan-1($-\sqrt{3}$ )=$ -$60o

iii.

1. for Z1

Z3=-1 using De-moivre theorem

Z3= ($\frac{1+\sqrt{3}i}{2})$3

r=$\sqrt{\left(\frac{1}{2}\right)^{2}+\left(\frac{\sqrt{3}}{2}\right)^{2}}$$=\sqrt{\frac{1}{4}+\frac{3}{4}}$ $\sqrt{\frac{4}{4}}$ =$ \sqrt{1}$ =1

Tanθ1=$\left(\frac{y}{x}\right)$

Tanθ1=$\left(\frac{\sqrt{3}}{2}÷\frac{1}{2}\right)$=$\sqrt{3}$

θ1=Tan-1($\sqrt{3}$ )=60o

Z= r(cosθ+isinθ)= (1)(cos(60)+isin(60))

Z3=$\left[(1)(cos(60)+isin(60))\right]^{3}$

Z3=(1)3$(cos(60×3)+isin(60×3)$)=(1)(cos180+isin180)

Z3=(1)(-1+0)=1(-1)=-1

L.H.S=R.H.S

Z3= ($\frac{1+\sqrt{3}i}{2})$3=-1

(b.) For Z2

Z3=-1 using De-moivre theorem

Z3= ($\frac{1-\sqrt{3}i}{2})$3

r=$\sqrt{\left(\frac{1}{2}\right)^{2}+\left(\frac{-\sqrt{3}}{2}\right)^{2}}$$=\sqrt{\frac{1}{4}+\frac{3}{4}}$ $\sqrt{\frac{4}{4}}$ =$ \sqrt{1}$ =1

Tanθ1=$\left(\frac{y}{x}\right)$

Tanθ1=$\left(\frac{-\sqrt{3}}{2}÷\frac{1}{2}\right)$=$-\sqrt{3}$

θ1=Tan-1($-\sqrt{3}$ )=-60o

Z= r(cosθ+isinθ)= (1)(cos(-60)+isin(-60))

Z3=$\left[(1)(cos(-60)+isin(-60))\right]^{3}$

Z3=(1)3$(cos(-60×3)+isin(-60×3)$)=(1)(cos(-180)+isin(-180))

Z3=(1)(-1+0)=1(-1)=-1

L.H.S=R.H.S

Z3= ($\frac{1-\sqrt{3}i}{2})$3=-1

(2.) Z1=3+4i

 Z2=8-4i

 Z3=2+3i

$$\left(\frac{Z\_{1}-Z\_{2}}{Z\_{3}}\right)$$

$\left(\frac{Z\_{1}-Z\_{2}}{Z\_{3}}\right)$=$ \frac{\left(3+4i\right)-(8-4i)}{(2+3i)}$

 =$\frac{3+4i-8+4i}{2+3i}$

 = $\frac{-5+8i}{2+3i}$

 =$\left(\frac{-5+8i}{2+3i}\right)\left(\frac{2-3i}{2-3i}\right)$

 =$\left(\frac{-10+15i+16i-24i^{2} }{4-6i+6i-9i^{2}}\right)$

 =$\frac{-10+31i-24(-1)}{4-9(-1)}$ = $\frac{-10+24+31i}{4+9}$

 =$\frac{14+31i}{13}$ = $\frac{14}{13}+\frac{31i}{13}$

 Re$\left(\frac{Z\_{1}-Z\_{2}}{Z\_{3}}\right)$=$ \frac{14}{13}$