

Tutorial 1. Math 2230A

14 Sep 2015

Section 1:

Q. Sketch

a) $0 \leq \arg z \leq \pi/4$ ($z \neq 0$)

b) $|2z+3| > 4$

c) $|z-2+i| \leq 1$

d) $\operatorname{Re}\left(\frac{1}{z}\right) \leq \frac{1}{2}$

Q. Sketch the Target Range of the maps f on D

a) $f(z) = \frac{R}{z}$, z in $D = \{|z| > R\}$

b) $f(z) = e^z$, z in $D = \{z = z_0 \text{ for } z_0 \in \mathbb{C} \text{ and } \forall t > 0\}$
Break

c) $f(z) = \frac{1}{z-1}$, $D = \{|z-1| = 1\}$

d) $f(z) = z^2$, $D = \{0 < \arg z < \pi/4, z \neq 0\}$

Hint: $z = x+iy$ for $(x,y) \in \mathbb{R}^2$.

Section 2:

Q. $(-8-8\sqrt{3}i)^{1/3} = ?$

Ans. ~~$\pm(\sqrt{3}-i)$, $\pm(1+\sqrt{3}i)$~~ $\begin{bmatrix} 2-2\sqrt{3}i \\ -2+2\sqrt{3}i \end{bmatrix}$

$\frac{8^{1/3}}{\sqrt{2}}$ $\begin{bmatrix} 2 \\ -1+\sqrt{3}i \\ -1-\sqrt{3}i \end{bmatrix}$

Hint. Assume $(-8-8\sqrt{3}i)^{1/3} = x+iy$

Q. Find $z^2+z+1=0$ Solution.

Hint: $z = x+iy$, $z = -\frac{1}{2} \pm \frac{\sqrt{3}}{2}i$