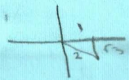
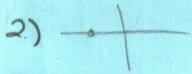


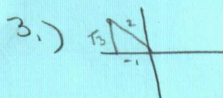
$$(-5, 150^\circ) \quad C \quad \text{point}$$



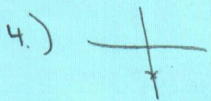
$$(-2, 120^\circ) \quad C \quad \text{point}$$



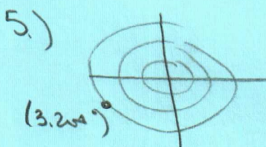
$$(2, \pi) \quad B \quad \text{point}$$



$$(2 \text{ cis } 120^\circ) \quad D \quad \text{complex \#}$$

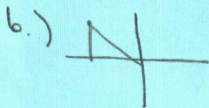


$$2 \text{ cis } 270^\circ \quad A \quad \text{complex \#}$$



$$(3, -160^\circ)$$

$$(-3, 20^\circ)$$

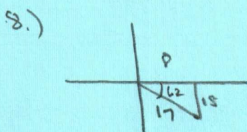


$$(4\sqrt{2}, 135^\circ)$$

$$7.) \quad x = r \cos \theta \quad y = r \sin \theta$$

$$\left(-2 \cos \frac{7\pi}{6}, -2 \sin \frac{7\pi}{6} \right)$$

$$(1.73, 1)$$

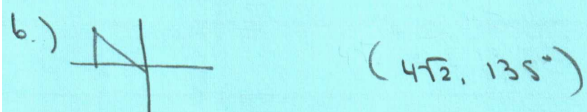
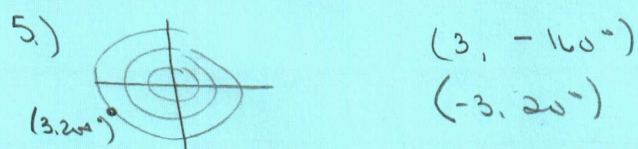
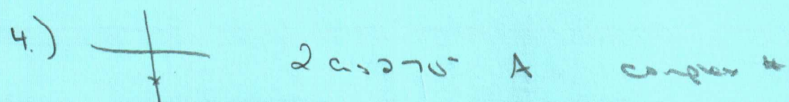
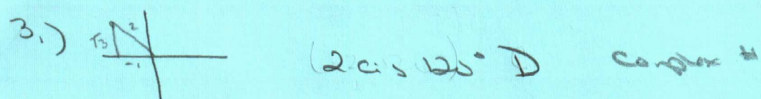
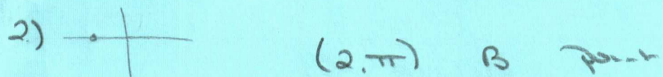
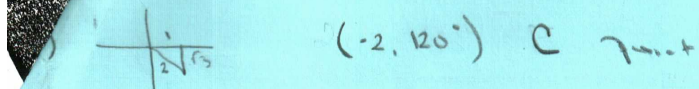


$$\tan^{-1}\left(\frac{15}{8}\right) = 61.9$$

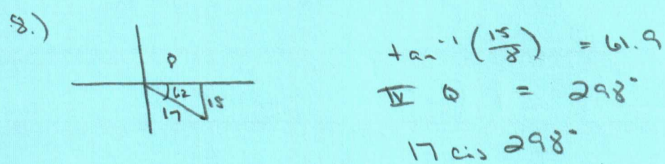
$$\text{IV } \theta = 298^\circ$$

$$17 \text{ cis } 298^\circ$$

$$9.) \quad 5(\cos 70^\circ + i \sin 70^\circ)$$



7.) $x = r \cos \theta$ $y = r \sin \theta$
 $(-2 \text{ cis } \frac{7\pi}{6}, -2 \text{ cis } \frac{7\pi}{6})$
 $(1.73, 1)$



9.) $5(\cos 70^\circ + i \sin 70^\circ)$

$$10.) \left(6 \operatorname{cis} \frac{7\pi}{12} \right) \left(\frac{1}{3} \operatorname{cis} \frac{\pi}{6} \right)$$

$$\left(6 \cdot \frac{1}{3} \right) \operatorname{cis} \left(\frac{7\pi}{12} + \frac{\pi}{6} \right)$$

$$2 \operatorname{cis} \frac{9\pi}{12} = 2 \operatorname{cis} \frac{3\pi}{4}$$

$$= 2(\cos 135^\circ + i \sin 135^\circ)$$

$$= 2\left(-\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2}i\right)$$

$$= -\sqrt{2} + i\sqrt{2}$$

$$11.) a = r \cos \theta$$

$$b = r \sin \theta$$

$$r = \sqrt{a^2 + b^2}$$

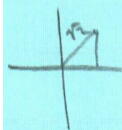
$$\frac{a}{r} = \cos \theta$$

$$\frac{b}{r} = \sin \theta$$

yes w/ substitution

$$12.) z = 1 + i$$

$$\sqrt{2} \operatorname{cis} 45^\circ = z$$



$$b.) z^{-1}$$

$$\frac{\sqrt{2}}{2} \operatorname{cis} 315^\circ$$

$$\frac{\sqrt{2}}{2} \operatorname{cis} 45^\circ \cdot -1$$

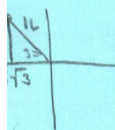
$$= \frac{\sqrt{2}}{2} \operatorname{cis} -45^\circ$$

$$c.) z^2 = 2 \operatorname{cis} 90^\circ$$

$$(1+i)(1+i) = 1 + 2i + i^2 = 2i$$

$$2 \operatorname{cis} 90^\circ = 2(\cos 90^\circ + i \sin 90^\circ) = 2i$$

$$13.) -8 + 8i\sqrt{3}$$



$$16 \operatorname{cis} 150^\circ = z$$

$$(16 \operatorname{cis} 150^\circ)^{1/4} = 2^{1/4}$$

$$16^{1/4} \operatorname{cis} \left(\frac{150}{4} + \frac{360k}{4} \right)$$

$$2 \operatorname{cis} 37.5^\circ$$

90° apart

$$127.5^\circ$$

$$217.5^\circ$$

$$(8 \cos 45^\circ, 8 \sin 45^\circ) \rightarrow (4\sqrt{2}, -4\sqrt{2})$$

2. table is symmetry

$$\begin{aligned} 3. \quad -2i &\rightarrow 2 \cos 270^\circ &= 2\sqrt{2} \cos (270^\circ + 225^\circ) \\ -1-i &\rightarrow \sqrt{2} \cos 225^\circ &= 2\sqrt{2} \cos 495^\circ \\ & &= 2\sqrt{2} \cos 135^\circ \\ & &\hookrightarrow -2+2i \end{aligned}$$



$$\begin{aligned} 4. \quad (-1-i)^4 &\rightarrow (\sqrt{2} \cos 225^\circ)^4 \\ &= 4 \cos (225^\circ \cdot 4) \\ &= 4 \cos 900^\circ \\ &= 4 \cos 180^\circ \end{aligned}$$

$$\begin{aligned} 5. \quad 4i &\rightarrow 4 \cos 90^\circ & (4 \cos 90^\circ)^{1/2} \\ \sqrt{2} + i\sqrt{2} &\leftarrow 2 \cos \frac{90^\circ}{2} &\Rightarrow 2 \cos 45^\circ \\ -\sqrt{2} - i\sqrt{2} &\leftarrow 2 \cos \frac{90^\circ}{2} + 180^\circ &\Rightarrow 2 \cos 225^\circ \end{aligned}$$

$$\begin{aligned} (\sqrt{2} + i\sqrt{2})^2 &= 2 + 2i + i^2 \cdot 2 \\ &= 4i \\ (\sqrt{2} - i\sqrt{2})^2 &= 2 - 2i + i^2 \cdot 2 \\ &= 4i \end{aligned}$$

PT ✱ ✱

- 1.) $(2, 90^\circ)$ 2.) $(6\sqrt{2}, -45^\circ)$ 3.) $(5, 143^\circ)$
- 4.) $(4 \cos 135^\circ, 4 \sin 135^\circ)$ 5.) $(8 \cos \frac{7\pi}{6}, 8 \sin \frac{7\pi}{6})$ 6.) $(10 \cos 310^\circ, 10 \sin 310^\circ)$
- $(-2\sqrt{2}, 2\sqrt{2})$ $(-4\sqrt{3}, -4)$ $(6.42, -7.66)$

7.) $\rightarrow$ a linear loop 8.) linear also loop
min $y = -1$

10.1 spiral

116

$$z_1 = 1 + i$$

$$z_2 = -1 - i\sqrt{3}$$

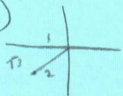
$$z_3 = \frac{3}{5} - \frac{4}{5}i$$



$$1) |z_1| = \sqrt{1^2 + 1^2} = \sqrt{2}$$

$$2) \sqrt{2} \operatorname{cis} 45^\circ$$

3)



$$2 \operatorname{cis} 240$$

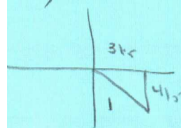
4)

$$(\sqrt{2} \operatorname{cis} 45^\circ)(2 \operatorname{cis} 240^\circ)$$

$$= 2\sqrt{2} \operatorname{cis} (240 + 45)$$

$$= 2\sqrt{2} \operatorname{cis} (285)$$

5)



$$1 \operatorname{cis} 307^\circ \leftarrow \text{round}$$

$$= (1^\circ \operatorname{cis} 307.10)$$

$$= 1 \operatorname{cis} 307.10$$

$$= -0.984 + -0.1736i$$

6)

$$(1 \operatorname{cis} 307)^\frac{1}{3} = 1^\frac{1}{3} \operatorname{cis} \left(\frac{307}{3} + \frac{360k}{3} \right)$$

$$= 1 \operatorname{cis} 102$$

$$= -0.212 + 0.978i$$

$$= 1 \operatorname{cis} 222$$

$$= -0.743 + -0.670i$$

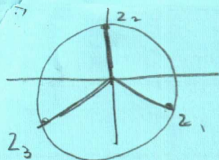
$$1 \operatorname{cis} 342$$

$$= 0.951 - 0.31i$$

$$z_1 = \sqrt{3} + i$$

$$z_2 = 2i$$

$$z_3 = -\sqrt{3} - i$$



19.) the points all lie on the circle
 since $z_1 = z_2 = z_3$ have same r value