

(15) ① Put answers in $a+bi$ form:

a) $(2-i)^2 + (1+i)$

b) Divide:

$$\frac{2-i}{3+2i}$$

c) $i^{41} - i^{23}$

(15) ② Solve $x^2 + x + 4 = 0$

(15) ③ a) Divide $\frac{8 \text{ cis } 200^\circ}{2 \text{ cis } 50^\circ}$

b) Convert $-4-5i$ to polar form with $r \geq 0$ and $0^\circ \leq \theta \leq 360^\circ$.

c) Find $(1-\sqrt{3}i)^3$ directly (using binomial theorem).

(15) ④ a) Find $(1-\sqrt{3}i)^3$ using De Moivre's Theorem. Put answer in rectangular form.
 b) Find the three cube roots of $8i$. Put answers in rectangular form.

c) Write the 6 sixth roots of 64 in polar form.

(10) ⑤ a) Sketch $x^2 = -6y$ and find its focus. Avoid fractional coordinates.

b) Find the equation of a parabola with its vertex at the origin, its axis the x axis, (next column)

and $(2, 1)$ on its graph.

(10) ⑥ a) Sketch

$$\frac{x^2}{49} + \frac{y^2}{25} = 1$$

b) Find the coordinates of its foci.

(15) ⑦ a) Sketch

$$\frac{x^2}{25} - \frac{y^2}{9} = 1$$

b) Find the coordinates of its foci.

c) Write the equations of its asymptotes.

(15) ⑧ a) Sketch

spts. $(x-1)^2 = 2(y+1)$

Avoid fractional coordinates.

b) Find the center and identify the type of conic.

(Do not sketch)

$$x^2 - 9y^2 - 4x - 54y - 86 = 0$$

MAC 1114 EXAM IV KEY (F '11)

① a) $4-4i + i^2 + 1+i$
 $= 4-4i -1 + 1+i = 4-3i$

b) $\frac{2-i}{3+2i} \cdot \frac{3-2i}{3-2i} = \frac{6-4i-3i+2i^2}{9+4}$
 $= \frac{4-7i}{13}$

c) $i - (-i) = 2i$

② $x = \frac{-1 \pm \sqrt{1^2 - 4(1)(4)}}{2(1)}$
 $= \frac{-1 \pm i\sqrt{15}}{2}$

③ a) $4 \text{ cis } 150^\circ$

b) $r^2 = 16 + 25 = 41 \quad r = \sqrt{41}$

$\tan \theta = \frac{5}{4} \quad \alpha \approx 51.3^\circ$

$\theta = 180^\circ + 51.3^\circ \approx 231.3^\circ$

$\sqrt{41} \text{ cis } 231.3^\circ$

c) $1^3 + 3(1)^2(-\sqrt{3}i) + 3(1)(-\sqrt{3}i)^2 + (-\sqrt{3}i)^3$
 $= 1 - 3\sqrt{3}i - 9 + 3\sqrt{3}i = -8$

④ a) $(2 \text{ cis } 300^\circ)^3 = 8 \text{ cis } 900^\circ$
 $= 8 \text{ cis } 180^\circ = -8$

b) $8i = 0 + 8i = 8 \text{ cis } 90^\circ$
 $8^{1/3} \text{ cis } \left(\frac{90^\circ + 360^\circ k}{3}\right) \quad k=0,1,2$

$2 \text{ cis } 30^\circ = 2\left(\frac{\sqrt{3}}{2} + \frac{1}{2}i\right) = \sqrt{3} + i$

$2 \text{ cis } 150^\circ = 2\left(-\frac{\sqrt{3}}{2} + \frac{1}{2}i\right) = -\sqrt{3} + i$

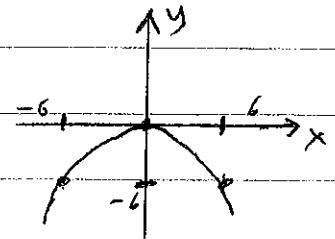
$2 \text{ cis } 270^\circ = -2i$

c) $2 \text{ cis } 0^\circ, 2 \text{ cis } 60^\circ, 2 \text{ cis } 120^\circ$
 $2 \text{ cis } 180^\circ, 2 \text{ cis } 240^\circ, 2 \text{ cis } 300^\circ$
 since $64 = 64 \text{ cis } 0^\circ$

⑤ a) $x^2 = -6y \quad 4a = -6 \Rightarrow a = -1.5$
 focus $(0, -1.5)$

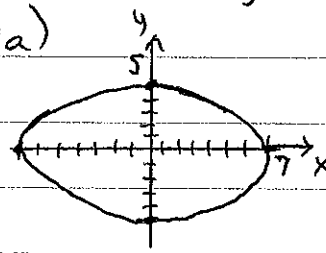
$-\frac{1}{6}x^2 = y$

x	y
0	0
± 6	-6



b) $y^2 = 4ax \quad 1^2 = 4a(2) \Rightarrow 4a = \frac{1}{2}$
 $y^2 = \frac{1}{2}x$

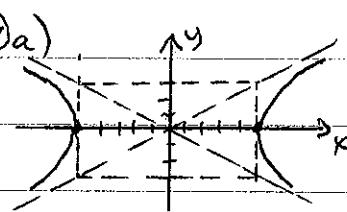
⑥ a)



b) $c^2 = \frac{a^2 - b^2}{25}$
 $= 24$

$(\pm\sqrt{24}, 0)$ or
 $(\pm 2\sqrt{6}, 0)$

⑦ a)



b) $c^2 = a^2 + b^2$
 $= 25 + 9$
 $= 34$

$(\pm\sqrt{34}, 0)$

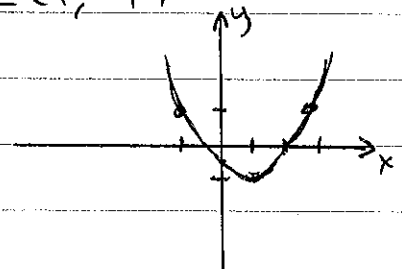
c) $y = \pm \frac{3}{5}x$

⑧ a) $(x-1)^2 = 2(y+1)$

$\frac{1}{2}(x-1)^2 - 1 = y$

vertex = $(1, -1)$

x	y
3	1
-1	1



b) $x^2 - 4x - 9y^2 - 54y = 86$

$x^2 - 4x + 4 - 9(y^2 + 6y + 9) = 86 + 4 - 81$

$(x-2)^2 - 9(y+3)^2 = 9$

$\frac{(x-2)^2}{9} - (y+3)^2 = 1$

hyperbola centered at $(2, -3)$