

(5) ① Find $(-\sqrt{3} + i)^3$ directly using the Binomial Theorem.

(15) ② a) Find $(-\sqrt{3} + i)^3$ using De Moivre's Theorem. Put answers in exact rectangular form.

b) Find all cube roots of -64 exactly. Put answers in $a + bi$ form. Use the n^{th} root theorem.

c) Find all fourth roots of $-1 + i$ in polar form.

(10) ③ a) Sketch and find the focus of $y^2 = -6x$.

b) Find the equation of a parabola whose axis of symmetry is the x axis, whose vertex is $(0, 0)$ and which passes through $(-2, 1)$.

(10) ④ a) Sketch

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

b) Find the coordinates of the foci for ④ a).

(15) ⑤ a) Sketch

$$16x^2 - 9y^2 = 144$$

b) Find the coordinates of the foci for ⑤ a).

c) Write the equations of the asymptotes for ⑤ a).

(15) ⑥ a) Find the center and type of conic.

$$25x^2 - 150x + 4y^2 + 8y = -129$$

Hint: Complete the square.

b) Sketch

$$4(y+2) = (x-1)^2$$

Avoid fractional values of x and y .

① $(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$

$(-\sqrt{3}+i)^3 = (-\sqrt{3})^3 + 3(-\sqrt{3})^2(i)$

$+ 3(-\sqrt{3})i^2 + i^3$

$= -3\sqrt{3} + 9i + 3\sqrt{3} - i = 8i$

② a) $-\sqrt{3} + i = 2 \text{ cis } 150^\circ$

$(2 \text{ cis } 150^\circ)^3 = 8 \text{ cis } 450^\circ$

$= 8 \text{ cis } 90^\circ = 8i$



b) $-64 = 64 \text{ cis } 180^\circ$

$64^{1/3} \text{ cis } \left(\frac{180^\circ + 360^\circ k}{3} \right)$

$k=0, 1, 2$

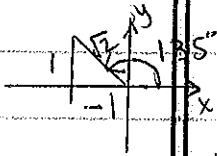
$4 \text{ cis } 60^\circ = 4\left(\frac{1}{2} + \frac{\sqrt{3}}{2}i\right) = 2 + 2\sqrt{3}i$

$4 \text{ cis } 180^\circ = -4$

$4 \text{ cis } 300^\circ = 4\left(\frac{1}{2} - \frac{\sqrt{3}}{2}i\right) = 2 - 2\sqrt{3}i$

c) $-1 + i = 2^{1/2} \text{ cis } 135^\circ$

$(2^{1/2})^{1/4} \text{ cis } \left(\frac{135^\circ + 360^\circ k}{4} \right)$



$w_1 = 2^{1/8} \text{ cis } 33.75^\circ$

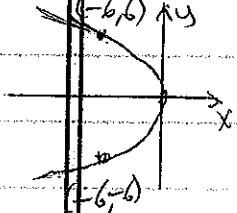
$w_2 = 2^{1/8} \text{ cis } 123.75^\circ$

$w_3 = 2^{1/8} \text{ cis } 213.75^\circ$

$w_4 = 2^{1/8} \text{ cis } 303.75^\circ$

③ a) $y^2 = -6x$ $4a = -6 \Rightarrow a = -\frac{3}{2}$

focus $(-\frac{3}{2}, 0)$



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

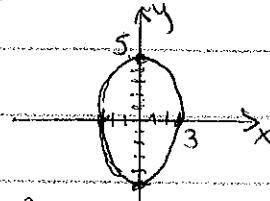
y	x
0	0
± 6	-6

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

(next column)

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

④ a)

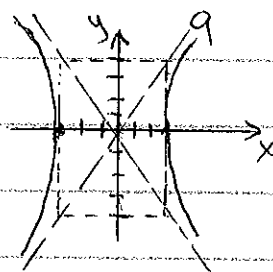


b) $c^2 = a^2 - b^2$

$= 25 - 9 = 16$

foci = $(0, \pm 4)$

⑤ a) Get $\frac{x^2}{9} - \frac{y^2}{16} = 1$



(3 over, 4 up)

b) $c^2 = a^2 + b^2 = 9 + 16$

$c^2 = 25 \Rightarrow c = 5$

foci are $(\pm 5, 0)$

c) $y = \pm \frac{4}{3}x$ from graph

⑥ a) $25(x^2 - 6x + 9) + 4(y^2 + 2y + 1)$

$= -129 + 225 + 4$

$25(x-3)^2 + 4(y+1)^2 = 100$

ellipse centered at $(3, -1)$

b) $y = \frac{1}{4}(x-1)^2 - 2$

x	y
1	-2
3	-1
-1	-1

