

(15) ① Put answers in  $a + bi$  form:

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

Watch your signs.

b) Divide:

$$\frac{1 - i}{3 + i}$$

c)  $i^0 + i^1 + i^2 + i^3 + i^4$

(5) ② Solve: (Answers in  $i$  form.)

$$x^2 + 6x + 25 = 0.$$

(15) ③ a) Multiply:

$$(2 \operatorname{cis} 100^\circ)(4 \operatorname{cis} 7^\circ)$$

Leave answer in polar form.

b) Convert  $4.31 \operatorname{cis} 98^\circ$

to rectangular form.

(Use calculator, Give

answers to 2 decimal places)

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

Use the Binomial Theorem.

(15) ④ a) Find  $(1 - i\sqrt{3})^3$  using

De Moivre's Theorem. Put

answer in rectangular form.

b) Find all fifth roots of  $-32i$  in polar form.

c) Find all fourth roots of  $-16$ . Put answers in exact rectangular form

(16) ⑤ a) Sketch

$$x^2 = -8y \text{ and find}$$

its focus. Avoid fractional coordinates.

b) Find the equation of a parabola with vertex at the origin, and directrix  $x = -3$ .

(10) ⑥ a) Sketch

$$\frac{x^2}{9} + \frac{y^2}{16} = 1$$

b) Find the coordinates of its foci.

(15) ⑦ a) Sketch

$$\frac{y^2}{16} - \frac{x^2}{4} = 1$$

b) Find the coordinates of its foci.

c) Write the equations of its asymptotes.

(15) ⑧ a) Sketch

$$10 \text{ pts. } y^2 - 4y - 3x + 1 = 0.$$

Hint: Complete the square.

Do not plot any fractional values.

b) Sketch

$$\frac{(x-1)^2}{25} + \frac{(y+3)^2}{9} = 1$$

MAC 1114 EX. IV KEY (SP'11)

① a)  $2+3i - (1-4i)^2 =$   
 $2+3i - (1-8i+16i^2) =$   
 $2+3i - (-15-8i) =$   
 $2+3i+15+8i = 17+11i$

b)  $\frac{(1-i)(3-i)}{(3+i)(3-i)} = \frac{3-3i-i+i^2}{9+1}$   
 $= \frac{2-4i}{10}$  or  $\frac{1-2i}{5}$

c)  $1+i-1-i+1=1$

②  $x = \frac{-6 \pm \sqrt{36-4(1)(25)}}{2}$   
 $= \frac{-6 \pm 8i}{2} = -3 \pm 4i$

③ a)  $8 \text{ cis } 107^\circ$

b)  $4.31 \cos 98^\circ + i 4.31 \sin 98^\circ$   
 $= -.60 + 4.27i$

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

④ a)  $1-i\sqrt{3} = 2 \text{ cis } (-60^\circ)$   
 $[2 \text{ cis } (-60^\circ)]^3 = 8 \text{ cis } (-180^\circ) = -8$

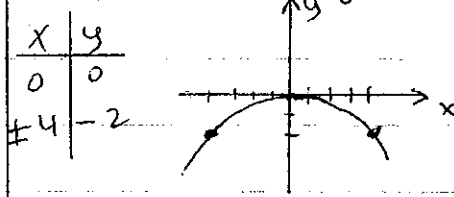
b)  $-32i = 32 \text{ cis } 270^\circ$   
 $32^{1/5} \text{ cis } \left( \frac{270^\circ + 360^\circ k}{5} \right) \quad k=0,1,2,3,4$

$2 \text{ cis } 54^\circ, 2 \text{ cis } 126^\circ, 2 \text{ cis } 198^\circ,$   
 $2 \text{ cis } 270^\circ, 2 \text{ cis } 342^\circ$

c)  $-16 = 16 \text{ cis } 180^\circ$   
 $16^{1/4} \text{ cis } \left( \frac{180^\circ + 360^\circ k}{4} \right) \quad k=0,1,2,3$   
 next column

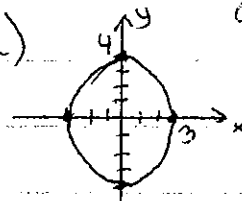
$2 \text{ cis } 45^\circ = \sqrt{2} + i\sqrt{2}$   
 $2 \text{ cis } 135^\circ = -\sqrt{2} + i\sqrt{2}$   
 $2 \text{ cis } 225^\circ = -\sqrt{2} - i\sqrt{2}$   
 $2 \text{ cis } 315^\circ = \sqrt{2} - i\sqrt{2}$

⑤ a)  $-\frac{1}{8}x^2 = y$        $4a = -8, a = -2$   
 focus  $(0, -2)$

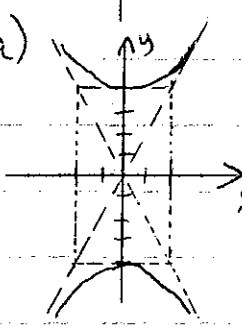


b)  $a = 3 \quad y^2 = 4ax \Rightarrow y^2 = 12x$

⑥ a)  $b) c^2 = a^2 - b^2$   
 $= 16 - 9 = 7$   
 $(0, \pm\sqrt{7})$



⑦ a)  $b) c^2 = a^2 + b^2$   
 $= 16 + 4 = 20$   
 $(0, \pm\sqrt{20})$  or  $(0, \pm 2\sqrt{5})$

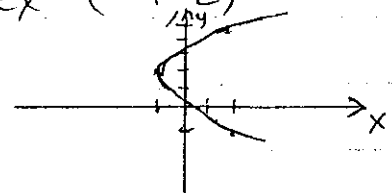


c)  $y = \pm \frac{4}{2}x$  or  $y = \pm 2x$

⑧ a)  $y^2 - 4y + 4 = 3x - 1 + 4$   
 $(y-2)^2 = 3x+3$   
 $1(y-2)^2 = 3(x+1)$

vertex  $(-1, 2)$

y	x
2	-1
5	2
-1	2



b)  $(1, 0)$   
 $(-4, -3)$        $(6, -3)$   
 $(1, -6)$

