## Matrix theory

1

(1983 - 1 Mark)

(1985 - 2 Marks)

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6) If z = x + iy and  $\omega = \frac{1 - iz}{z - i}$ , then  $|\omega| = 1$  implies that, in the complex plane (1983 - 1)

7) The points  $z_1, z_2, z_3, z_4$  in the complex plane are the vertices of a parallelogram taken

8) If a, b, c and u, v, w are complex numbers representing the vertices of two triangles such that c = (1 - r)a + rb and w = (1 - r)u + rv, where r is a complex number, then

9) If  $\omega \neq 1$  is a cube root of unity and  $(1 + \omega)^7 = A + B\omega$  then A and B are respectively

c)  $z_1 + z_2 = z_3 + z_4$ 

d) None of these

c) are congruent

d) none of these

Mark)

a) z lies on the imaginary axisb) z lies on the real axisc) z lies on unit circled) None of these

in order if and only if

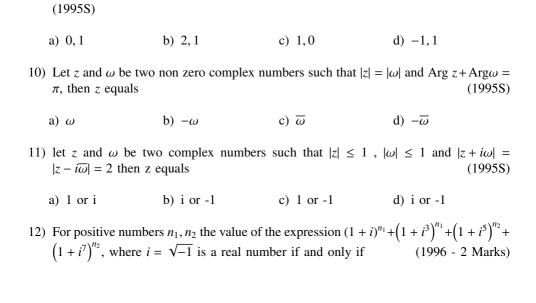
a)  $z_1 + z_4 = z_2 + z_3$ 

b)  $z_1 + z_3 = z_2 + z_4$ 

the two triangles

b) are similar

a) have the same area



(2000S)

15) If $z_1, z_2$ and $z_3$ are complex numbers such that $ z_1  =  z_2  =  z_3  = \left \frac{1}{z_1} + \frac{1}{z_2} + \frac{1}{z_3}\right  = 1$ , then $ z_1 + z_2 + z_3 $ is (2000S)				
<ul><li>a) equal to 1</li><li>b) less than 1</li></ul>		c) greater than 3 d) equal to 3	· ·	
16) Let $z_1$ and $z_2$ be $n^{th}$ roots of unity which substend a right angle at the origin. Then n must be of the form (2001S)				
a) $4k + 1$	b) $4k + 2$	c) $4k + 3$	d) 4k	
<ul> <li>17) The complex numbers z<sub>1</sub>, z<sub>2</sub> and z<sub>3</sub> satisfying z<sub>1-z<sub>3</sub></sub> = 1-i√3/2 are the vertices of a triangle which is (2001S)</li> <li>a) of area zero</li> <li>b) right angled triangle</li> <li>c) equilateral</li> <li>d) obtuse-angled triangle</li> </ul>				
18) For all complex numbers $z_1, z_2$ satisfying $ z_1  = 12$ and $ z_2 - 3 - i  = 5$ , the minimum value of $ z_1 - z_2 $ (2002S)				
a) 0	b) 2	c) 7	d) 17	
19) If $ z  = 1$ and $\omega = \frac{z-1}{z+1}$ (where $z \neq 1$ ), then $Re(\omega)$ is (2003S)				
a) 0 b) $\frac{-1}{ z+1 ^2}$		c) $\left  \frac{z}{z+1} \right  \cdot \frac{1}{ z+1 ^2}$ d) $\frac{\sqrt{2}}{ z+1 ^2}$		
20) If $\omega \neq 1$ be a cube root of unity and $(1 + \omega^2)^n = (1 + \omega^4)^n$ , then the least positive value of n is (2004S)				

c)  $n_1 = n_2$ 

13) If  $i = \sqrt{-1}$  then  $4 + 5\left(\frac{-1}{2} + \frac{i\sqrt{3}}{2}\right)^{334} + 3\left(\frac{-1}{2} + \frac{i\sqrt{3}}{2}\right)^{365}$  is a real number if and only if (1999 - 2 Marks)

c)  $\frac{-\pi}{2}$ 

a)  $1 - i\sqrt{3}$  b)  $-1 + i\sqrt{3}$  c)  $i\sqrt{3}$ 

b)  $-\pi$ 

14) If Arg z < 0, then Arg -z - Arg z =

d)  $n_1 > 0, n_2 > 0$ 

d)  $-i\sqrt{3}$ 

d)  $\frac{\pi}{2}$ 

a)  $n_1 = n_2 + 1$ b)  $n_1 = n_2 - 1$ 

a) π

d) 6