Matrix theory

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

- a) z lies on the imaginary axis
- b) z lies on the real axis
- c) z lies on unit circle
- d) None of these
- 7) The points z_1, z_2, z_3, z_4 in the complex plane are the vertices of a parallelogram taken in order if and only if (1983 - 1 Mark)

 - a) $z_1 + z_4 = z_2 + z_3$ c) $z_1 + z_2 = z_3 + z_4$
 - b) $z_1 + z_3 = z_2 + z_4$ d) None of these
- 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 the two triangles (1985 - 2 Marks)
 - a) have the same area c) are congruent
 - b) are similar
- d) none of these
- 9) If $\omega \neq 1$ is a cube root of unity and $(1 + \omega)^7 =$ $A + B\omega$ then A and B are respectively (1995S)
 - a) 0, 1
- b) 2, 1
- c) 1,0
- d) -1, 1
- 10) Let z and ω be two non zero complex numbers such that $|z| = |\omega|$ and Arg $z + \text{Arg}\omega = \pi$, then z equals (1995S)
 - a) ω
- b) $-\omega$
- c) $\overline{\omega}$
- d) $-\overline{\omega}$

11) let
$$z$$
 and ω be two complex numbers such that $|z| \le 1$, $|\omega| \le 1$ and $|z + i\omega| = |z - i\overline{\omega}| = 2$ then z equals (1995S)

- a) 1 or i b) i or -1 c) 1 or -1 d) i or -1
- 12) For positive numbers n_1, n_2 the value of the expression $(1+i)^{n_1} + (1+i^3)^{n_1} + (1+i^5)^{n_2} +$ $(1+i^7)^{n_2}$, where $i=\sqrt{-1}$ is a real number if (1996 - 2 Marks)

- a) $n_1 = n_2 + 1$ b) $n_1 = n_2 1$ c) $n_1 = n_2$ d) $n_1 > 0, n_2 > 0$

13) If
$$i = \sqrt{-1}$$
 then $4 + 5\left(\frac{-1}{2} + \frac{i\sqrt{3}}{2}\right)^3 34 + 3\left(\frac{-1}{2} + \frac{i\sqrt{3}}{2}\right)^{365}$ is a real number if and only if (1999 - 2 Marks)

- a) $1 i\sqrt{3}$ b) $-1 + i\sqrt{3}$ i $\sqrt{3}$ d) $-i\sqrt{3}$
- 14) If Arg z < 0, then Argz Arg z =(2000S)
 - a) π b) $-\pi$ c) $\frac{-\pi}{2}$ d) $\frac{\pi}{2}$

- 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)
 - a) equal to 1
- c) greater than 3
- b) less than 1
- 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

- 17) The complex numbers z_1, z_2 and z_3 satisfying $\frac{z_1-z_3}{z_2-z_3} = \frac{1-i\sqrt{3}}{2}$ are the vertices of a triangle which is
 - a) of area zero
 - b) right angled triangle
 - c) equilateral
 - d) obtuse-angled triangle
- 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

19) If
$$|z| = 1$$
 and $\omega = \frac{z-1}{z+1}$ (where $z \neq 1$), then Re (ω) is (2003S)

c)
$$\left|\frac{z}{z+1}\right| \cdot \frac{1}{|z+1|^2}$$

d) $\frac{\sqrt{2}}{|z+1|^2}$

a) 0
b)
$$\frac{-1}{|z+1|^2}$$

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)
 - a) 2
- b) 3 c) 5
- d) 6