

# JEE MAINS 6 Sept 2020 Shift-1

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1) The region represented by  $\{z = x + iy \in \mathbb{C} : z - \operatorname{Re}(z) \leq 1\}$  is also given by the inequality :  $\{z = x + iy \in \mathbb{C} : z - \operatorname{Re}(z) \leq 1\}$

a)  $y^2 \leq 2\left(x + \frac{1}{2}\right)$       b)  $y^2 \leq x + \frac{1}{2}$       c)  $y^2 \leq 2(x + 1)$       d)  $y^2 \leq x + 1$

2) The negation of the Boolean expression  $p \vee (\sim p \wedge q)$  is equivalent to :

a)  $\sim p \vee \sim q$       b)  $\sim p \vee q$       c)  $\sim p \wedge \sim q$       d)  $p \wedge \sim q$

3) The general solution of the differential equation  $\sqrt{1+x^2+y^2+x^2y^2} + xy\left(\frac{dy}{dx}\right) = 0$  (where C is a constant of integration)

a)  $\sqrt{1+y^2} + \sqrt{1+x^2} = \frac{1}{2} \log_e \left( \frac{\sqrt{1+x^2}-1}{\sqrt{1+x^2}+1} \right) + c$

b)  $\sqrt{1+y^2} - \sqrt{1+x^2} = \frac{1}{2} \log_e \left( \frac{\sqrt{1+x^2}-1}{\sqrt{1+x^2}+1} \right) + c$

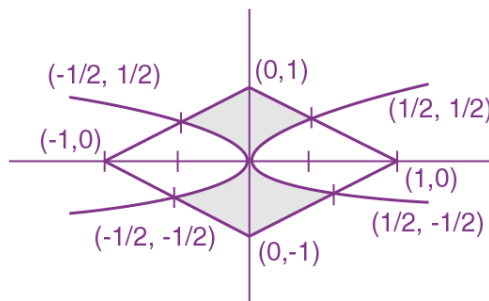
c)  $\sqrt{1+y^2} + \sqrt{1+x^2} = \frac{1}{2} \log_e \left( \frac{\sqrt{1+x^2}+1}{\sqrt{1+x^2}-1} \right) + c$

d)  $\sqrt{1+y^2} - \sqrt{1+x^2} = \frac{1}{2} \log_e \left( \frac{\sqrt{1+x^2}+1}{\sqrt{1+x^2}-1} \right) + c$

4) Let  $L_1$  be a tangent to the parabola  $y^2 = 4(x+1)$  and  $L_2$  be a tangent to the parabola  $y^2 = 8(x+2)$  such that  $L_1$  and  $L_2$  intersect at right angles. Then  $L_1$  and  $L_2$  meet on the straight line:

a)  $x + 2y = 0$       b)  $x + 2 = 0$       c)  $2x + 1 = 0$       d)  $x + 3 = 0$

5) The area (in sq. units) of the region  $A = \{(x, y) : |x| + |y| \leq 1, 2y^2 \geq |x|\}$



- a)  $\frac{1}{6}$                       b)  $\frac{5}{6}$                       c)  $\frac{1}{3}$                       d)  $\frac{7}{6}$

6) The shortest distance between the lines  $\frac{x-1}{0} = \frac{y+1}{-1} = \frac{z}{1}$  and  $x + y + z + 1 = 0, 2x - y + z + 3 = 0$  is :

- a) 1                      b)  $\frac{1}{\sqrt{2}}$                       c)  $\frac{1}{\sqrt{3}}$                       d)  $\frac{1}{2}$

7) Let  $a, b, c, d$  and  $p$  be any non zero distinct real numbers such that  $(a^2 + b^2 + c^2)p^2 - 2(ab + bc + cd)p + (b^2 + c^2 + d^2) = 0$ . Then:

- a)  $a, c, p$  are in G.P.                      c)  $a, b, c, d$  are in A.P.  
b)  $a, b, c, d$  are in G.P.                      d)  $a, c, p$  are in A.P.

8) Two families with three members each and one family with four members are to be seated in a row. In how many ways can they be seated so that the same family members are not separated?

- a)  $(2!)(3!)(4!)$                       b)  $(3!)^3(4!)$                       c)  $(3!)(4!)^3$                       d)  $(3!)^2(4!)$

9) The values of  $\lambda$  and  $\mu$  for which the system of linear equations

$$x + y + z = 2$$

$$x + 2y + 3z = 5$$

$$x + 3y + \lambda z = \mu$$

has infinitely many solutions are, respectively:

- a) 6 and 8                      b) 5 and 8                      c) 5 and 7                      d) 4 and 9

10) Let  $m$  and  $M$  be respectively the minimum and maximum values of

$$\begin{vmatrix} \cos^2 x & 1 + \sin^2 x & \sin 2x \\ 1 + \cos^2 x & \sin^2 x & \sin 2x \\ \cos^2 x & \sin^2 x & 1 + \sin 2x \end{vmatrix}$$

Then the ordered pair  $(m, M)$  is equal to:

- a)  $(-3, -1)$                       b)  $(-4, -1)$                       c)  $(1, 3)$                       d)  $(-3, 3)$

11) A ray of light coming from the point  $\left(\frac{2}{2\sqrt{3}}\right)$  is incident at an angle  $30^\circ$  on the line  $x = 1$  at the point **A**. The ray gets reflected on the line  $x = 1$  and meets x-axis at the point **B**. Then, the line AB passes through the point:

- a)  $\left(\frac{4}{-\sqrt{3}}\right)$                       b)  $\left(\frac{3}{-\frac{1}{\sqrt{3}}}\right)$                       c)  $\left(\frac{3}{-\sqrt{3}}\right)$                       d)  $\left(\frac{4}{-\frac{\sqrt{3}}{2}}\right)$

12) Out of 11 consecutive natural numbers if three numbers are selected at random (without repetition), then the probability that they are in A.P. with positive common difference, is:

a)  $\frac{10}{99}$

b)  $\frac{5}{33}$

c)  $\frac{15}{101}$

d)  $\frac{5}{101}$

13) If  $f(x+y) = f(x)f(y)$  and  $\sum_{x=1}^{\infty} f(x) = 2$ ,

$x, y \in \mathbb{N}$ , where  $\mathbb{N}$  is the set of all natural number, then the value of  $\frac{f(4)}{f(2)}$  is:

a)  $\frac{2}{3}$

b)  $\frac{1}{9}$

c)  $\frac{1}{3}$

d)  $\frac{4}{9}$

14) If  $\{p\}$  denotes the fractional part of the number  $p$ , then  $\left\{\frac{3^{200}}{8}\right\}$  is equal to:

a)  $\frac{5}{8}$

b)  $\frac{1}{8}$

c)  $\frac{7}{8}$

d)  $\frac{3}{8}$

15) Which of the following points lies on the locus of the foot of perpendicular drawn upon any tangent to the ellipse  $\left(\frac{x^2}{4}\right) + \left(\frac{y^2}{2}\right) = 1$  from any of its foci ?

a)  $\begin{pmatrix} -1 \\ -\sqrt{3} \end{pmatrix}$

b)  $\begin{pmatrix} -2 \\ -\sqrt{3} \end{pmatrix}$

c)  $\begin{pmatrix} -1 \\ -\sqrt{2} \end{pmatrix}$

d)  $\begin{pmatrix} 1 \\ 2 \end{pmatrix}$

