Assignment-3

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1) Let $P = (-1, 0)$, $Q = (0, 0)$ and $R = \left(3, 3\sqrt{3}\right)$ be three points. The equation of the bisector of the angle PQR is   [2007]

   (a) $\frac{\sqrt{3}}{2}x + y = 0$ (c) $\sqrt{3}x + y = 0$
   (b) $x + \sqrt{3}y = 0$ (d) $x + \frac{\sqrt{3}}{2}y = 0$

2) If one of the lines of $my^2 + (1 - m^2)xy - mx^2 = 80$ is a bisector of the angle between the lines $xy = 0$, then m is

   [2007]

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

3) The perpendicular bisector of the line segment joining $P(1, 4)$ and $Q(k, 3)$ has y-intercept -4. Then a possible value of k is   [2008]

   (a) 1   (b) 2   (c) -2   (d) -4

4) The shortest distance between the line $y - x = 1$ and the curve $x = y^2$ is   [2009]

   (a) $\frac{2\sqrt{3}}{8}$ (b) $\frac{3\sqrt{2}}{5}$ (c) $\frac{\sqrt{3}}{4}$ (d) $\frac{3\sqrt{2}}{8}$

5) The lines $p\left(p^2 + 1\right)x - y + q = 0$ and $\left(p^2 + 1\right)^2 x + (p^2 + 1)y + 2q = 0$ are perpendicular to a common line for :   [2009]
   (a) exactly one values of p
   (b) exactly two values of p
   (c) more than two values of p
   (d) no value of p

6) Three distinct points A, B and C are given in the 2-dimensional coordinates plane such that the ratio of the distance of any one of them from the point $(1, 0)$ to the distance from the point $(-1, 0)$ is equal to $\frac{1}{3}$. Then the circumcentre of the triangle ABC is at the point: [2009]

   (a) $\left(\frac{5}{4}, 0\right)$ (b) $\left(\frac{5}{2}, 0\right)$ (c) $\left(\frac{5}{3}, 0\right)$ (d) $(0, 0)$

7) The line L given by $\frac{x}{5} + \frac{y}{b} = 1$ passes through the point $(13, 32)$. The line K is parallel to the line L and has the equation $\frac{x}{c} + \frac{y}{3} = 1$. Then the distance between L and K is   [2010]

   (a) $\sqrt{17}$ (b) $\frac{17}{\sqrt{15}}$ (c) $\frac{23}{\sqrt{17}}$ (d) $\frac{23}{\sqrt{15}}$

8) Lines $L_1 : y - x = 0$ and $L_2 : 2x + y = 0$ intersect the line $L_3 : y + 2 = 0$ at P and Q, respectively. The bisector of the acute angle between L_1 and L_2 intersects L_3 at R.
   STATEMENT-1 : The ratio $PR : RQ$ equals $2\sqrt{2} : \sqrt{5}$.
   STATEMENT-2 : In any triangle, bisector of an angle divides the triangle into two similar triangles.

   [2011]

   (a) Statement-1 is True, Statement-2 is True Statement-2 is not a correct explanation for Statement-1
   (b) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1
   (c) Statement-I is True, Statement-2 is False
   (d) Statement-1 is False, Statement-2 is True.

9) If the line $2x + y = k$ passes through the point which divides the line segment joining the points $(1, 1)$ and $(2, 4)$ in the ration 3:2, then k equals: [2012]

   (a) $\frac{29}{5}$ (b) 5   (c) 6   (d) $\frac{11}{5}$

10) A ray of light along $x + \sqrt{3}y = \sqrt{3}$ gets reflected upon reaching the x-axis, the equation of the reflected ray is   [JEE M 2013]

   (a) $y = x + \sqrt{3}$ (c) $y = \sqrt{3}x - \sqrt{3}$
   (b) $\sqrt{3}y = x - \sqrt{3}$ (d) $\sqrt{3}y = x - 1$

11) The x-coordinate of the incentre of the triangle that has the coordinates of mid points of its sides as $(0, 1)$, $(1, 1)$ and $(1, 0)$ is:

   [JEE M 2013]

(a) $2 + \sqrt{2}$ (b) $2 - \sqrt{2}$ (c) $1 + \sqrt{2}$ (d) $1 - \sqrt{2}$

12) Let PS be the median of the triangle with vertices $P(2,2)$, $Q(6,-1)$ and $R(7,3)$. The equation of the line passing through $(1,-1)$ and parallel to PS is: [JEE M 2014]

(a) $4x + 7y + 3 = 0$
(b) $2x - 9y - 11 = 0$
(c) $4x - 7y - 11 = 0$
(d) $2x + 9y + 7 = 0$

13) Let a, b, c and d be non-zero numbers. If the point of intersection of the lines $4ax+2ay+c = 0$ and $5bx + 2by + d = 0$ lies in the fourth quadrant and is equidistant from the two axes then [JEE M 2014]

(a) $3bc - 2ad = 0$
(b) $3bc + 2ad = 0$
(c) $2bc - 3ad = 0$
(d) $2bc + 3ad = 0$

14) The number of points, having both co-ordinates as integers, that lie in the interior of the triangle with vertices $(0,0)$, $(0,41)$ and $(41,0)$ is: [JEE M 2015]

(a) 820 (b) 780 (c) 901 (d) 861

15) Two sides of a rhombus are along the lines, $x - y + 1 = 0$ and $7x - y - 5 = 0$. If its diagonals intersect at $(-1,-2)$, then which one of the following is a vertex of this rhombus? [JEE M 2016]

(a) $\left(\frac{1}{3}, -\frac{8}{3}\right)$
(b) $\left(-\frac{10}{3}, -\frac{7}{3}\right)$
(c) $(-3, -9)$
(d) $(-3, -8)$

16) A straight the through a fixed point $(2, 3)$ intersects the coordinate axes at distinct points P and Q. If O is the origin and the rectangle $OPRQ$ is completed, then the locus of R is: [JEE M 2018]

(a) $2x + 3y = xy$
(b) $3x + 2y = xy$
(c) $3x + 2y = 6xy$
(d) $3x + 2y = 6$

17) Consider the set of all lines $px + qy + r = 0$ such that $3p + 2q + 4r = 0$. Which one of the following statements is true? [JEE M 2019- 9 Jan (M)]

(a) The lines are concurrent at the point $\left(\frac{3}{4}, \frac{1}{2}\right)$
(b) Each line passes through the origin.
(c) The lines are all parallel.
(d) The lines are not concurrent.

18) Slope of a line passing through $P(2,3)$ and intersecting the line $x + y = 7$ at a distance of 4 units from P, is: [JEE M 2019- 9 April(M)]

(a) $\frac{1-\sqrt{5}}{1+\sqrt{5}}$
(b) $\frac{1-\sqrt{7}}{1+\sqrt{7}}$
(c) $\frac{\sqrt{7}-1}{\sqrt{7}+1}$
(d) $\frac{\sqrt{5}-1}{\sqrt{5}+1}$