MATHS

BOOKS - ML KHANNA

PAIR OF STRAIGHT LINES

Problem Set 1 Multiple Choice Questions

1. The angle between the lines given by the equation $\lambda y^2 + (1 - \lambda^2) xy - \lambda x^2 = 0$ is

A. 45°

B. 60°

C. 90°

D. 15°

Answer: C

2. The angle between the pair of striaght lines $y^2 \sin^2 \theta - xy \sin^2 \theta + x^2 (\cos^2 \theta - 1) = 0$ is

A. $\pi / 3$

B. $\pi / 4$

C. $2\pi / 3$

D. none of these

Answer: D

3. The angle between the straight lines $x^2 + 4xy + y^2 = 0$ is

A. $30°$

B. $45°$

C. $60°$

D. $90°$

Answer: C

4. The lines given by the equation $(y^2 - 4xy - x^2)(x + y - 1) = 0$ form a triangle which is

    A. equilateral

    B. isosceles

    C. right angled

    D. obtuse angled

Answer: C

5. The angle between the lines given by the equation

$\alpha y^2 + (1 - \alpha^2)xy - \alpha x^2 = 0$ is same as the angle between the lines

A. $5x^2 + 2xy - 3y^2 = 0$

B. $5x^2 + 16xy + 5y^2 = 0$

C. $xy = 0$

D. $x^2 - 2xy - 3y^2 = 0$

Answer: C

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6. The angle between the pair of lines given by the equation

$x^2 + 2xy - y^2 = 0$ is

A. $\pi / 3$

B. $\pi / 6$

C. $\pi / 2$

D. 0

Answer: C

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7. Which of the following pair of straight lines intersect at right angle?

A. $2x^2 = y(x + 2y)$

B. $(x + y)^2 = x(y + 3x)$

C. $2y(x + y) = xy$

D. $y = \ -\ + 2x$

Answer: A

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8. Prove that the straight lines joining the origin to the point of intersection of the straight line $hx + ky = 2hk$ and the curve $(x - k)^2 + (y - h)^2 = c^2$ are perpendicular to each other if $h^2 + k^2 = c^2$.

A. 0

B. a

C. a^2

D. -1

Answer: C

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9. If the straight lines joining origin to the points of intersections of the line $x + y = 1$ with the curve $x^2 + y^2 + x - 2y - m = 0$ are perpendicular to each other than the value of m should be

A. 0

B. $1/2$

C. 1

D. $= -1$

Answer: B

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10. The straight lines joining origin to the points of intersection of the straight line $3x - y - 2 = 0$ and the curve $7x^2 - 4xy + 8y^2 + 2x - 4y - 8 = 0$ are inclined to each other at angle

A. $\pi/4$

B. $\pi/3$

C. $\pi/2$

D. none of these

Answer: C

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11. The lines joining the origin to the points of intersection of the curve

$$ax^2 + 2hxy + by^2 + 2gx = 0$$

and $a_1x^2 + 2b_1xy + b_1y^2 + 2g_1x = 0$ are $\perp$ then

A. $\dfrac{a+b}{g_1} = \dfrac{a_1+b_1}{g}$

B. $(a+b)g_1 = (a_1+b_1)g$

C. $(a-b)g = (a_1-b_1)g_1$

D. none of these

Answer: B

12. The lines joining the origin to the points of intersection of the line $4x - 3y = 10$ with the circle $x^2 + y^2 + 3x - 6y - 20 = 0$ are mutually perpendicular.

    A. parallel

    B. perpendicular

    C. inclined at the angle of $45°$

    D. nione

Answer: A

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13. Show that all chords of the curve $3x^2 - y^2 - 2x + 4y = 0$, which subtend a right angle at the origin, pass through a fixed point. Find the coordinates of the point.

    A. (1,-2)

B. (1,2)

C. (-1,2)

D. (-1,-2)

Answer: A

14. if $h^2 = ab$, then the lines represented by $ax^2 + 2hxy + by^2 = 0$ are

A. parallel

B. perpendicular

C. coincident

D. none of these

Answer: C

15. The angle between the pair of straight lines $x^2 + 4y^2 - 7xy = 0$ is

A. $\tan^{-1}(1/3)$

B. $\tan^{-1}(1/2)$

C. $\tan^{-1}(\sqrt{3})/5)$

D. $\tan^{-1}(5/\sqrt{3})$

Answer: C

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16. The difference of tangents of the angles which the lines given by

$x^2(\tan^2\alpha + \cos^2\alpha) - 2xy\tan\alpha + y^2\sin^2\alpha = 0$ make with the x -axis is

A. 1

B. 2

C. $\sin 2\theta$

D. $2\sin\theta$

Answer: B

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17. If the slope of the lines given by $a^2x^2 + 2hxy + b^2y^2 = 0$ be three times of the other , then h is equal to

A. $2\sqrt{3}ab$

B. $-2\sqrt{3}ab$

C. $\dfrac{2}{\sqrt{3}}ab$

D. $-\dfrac{2}{\sqrt{3}}ab$

Answer: C::D

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18. The equation $ax^2 = 2hxy + by^2 = 0$ represented a pair of coincident lines through the origin if

A. $h^2 = ab$

B. $2h = ab$

C. $a = bh$

D. $b = ah$

Answer: A

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19. If the sum of the slopes of the lines given by $x^2 - 2cxy - 7y^2 = 0$ is

four times their product then c has the value

A. 1

B. -1

C. 2

D. -2

Answer: C

20. If one of the lines given by

$6x^2 - xy + 4cy^2 = 0$ is $3x + 4y = 0$, then c=

A. 1

B. -1

C. 3

D. -3

Answer: D

21. The straight lines

$(A^2 - 3B^2)x^2 + 8ABXy + (B^2 - 3A^2)y^2 = 0$ form with the line

$Ax + By + C = 0$ an equilateral triangle of area

A. $\dfrac{c^2}{\sqrt{2}.\,(A^2 + B^2)}$

B. $\dfrac{c^2}{\sqrt{3}.\,(A^2 + B^2)}$

C. $\dfrac{c^2}{A^2 + B^2}$

D. none of these

Answer: B

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22. The angle between the straight lines represented by $(x^2 + y^2)\sin^2\alpha = (x\cos\alpha - y\sin\alpha)^2$ is

A. α

B. 2α

C. $\pi - 2\alpha$

D. none of these

Answer: B::C

23. Equation of pair of straight lines drawn thrugh (1,1) and perpendicular to the pair of lines $3x^2 - 7xy - 2y^2 = 0$ is

    A. $2x^2 + 7xy - 11x + 6 = 0$

    B. $2(x-1)^2 + 7(x-1)(y-1) - 3y^2 = 0$

    C. $2(x-1)^2 + 7(x-1)(y-1) + 3(y-1)^2 = 0$

    D. none of these

Answer: D

24. Two of the lines represented by the equation $ax^3 + 3bx^2 = 3cxy^2 + dy^3 = 0$ will be perpendicular if

    A. $a^2 + d^2 + 3(ac + bd) = 0$

B. $a^2 + d^2 + 3(ac + bd) = 0$

C. $a^2 + d^2 + 3(ac - bd) = 0$

D. none of these

Answer: A

25. Equation $ax^3 - 9yx^2 - y^2x + 4y^3 = 0$ represents three straight lines. If two of the lines are perpendicular then a=

A. 5

B. -5

C. 4

D. -4

Answer: A::D

26. Area of the triangle formed by the lines $y^2 - 9xy + 18x^2 = 0$ and $y = 9$ is

A. $27/4$

B. 0

C. $9/3$

D. 27

Answer: A

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27. The equation $3x^2 - 8xy - 3y^2 = 0$ and $x + 2y = 3$ represent the sides of a triangle which is

A. equilateral

B. right angled

C. isosceles

D. isosceles rt. Angled

Answer: D

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28. If a pair of lines $x^2 - 2px - y^2 = 0$ and $x^2 - 2qxy - y^2 = 0$ is such

that each pair bisects the angle between the other pair, then

A. $pq = -1$

B. $pq = 1$

C. $\dfrac{1}{p} + \dfrac{1}{q} = 0$

D. $\dfrac{1}{p} - \dfrac{1}{q} = 0$

Answer: A

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29. The two sets of pair of lines given by $ax^2 - 2xy + by^2 = 0$ and $bx^2 - 2xy + ay^2 = 0$ be such that each pair bisects the angle between the other pair,

A. $a - b = 2$

B. $a + b = 0$

C. $a + b = 2$

D. $a - b = -2$

Answer: A::B::D

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30. If the pair of straight lines $ax^2 + 2hxy - ay^2 = 0$ and $bx^2 + 2gxy - by^2 = 0$ be such that each bisects the angle between the other then

A. $ag + bh = 0$

B. $bg + ah = 0$

C. $gh + ab = 0$

D. $h^2 - ab = 0$

Answer: C

31. If one of the lines of the pair $ax^2 + 2hxy + by^2 = 0$ bisects the angle between positive direction of the axes, then a, b and h satisfy the relation.

A. $a + b = 2|h|$

B. $a + b = -2h$

C. $a - b = -2|h|$

D. $(a - b)^2 = 4h^2$

Answer: B

32. The given between one of the lines give by $ax^2 + 2hxy + by^2 = 0$ and one of the lines $ax^2 + 2hxy + by^2 + \lambda(x^2 + y^2) = 0$ is equal to the angle between the other two lines of the system then λ=

A. 2

B. 3

C. 4

D. any real number

Answer: D

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33. The equation to the pair of lines through the origin which are perpendicular to the lines represented by $ax^2 + 2hxy + by^2 = 0$ is

A. $bx^2 + 2hxy + ay^2 = 0$

B. $bx^2 + 2hxy - bh^2 = 0$

C. $bx^2 - 2hxy + ay^2 = 0$

D. none of these

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34. The image of the pair of lines represented by $ax^2 + 2hxy + by^2 = 0$ by the line mirror y=0 is

A. $ax^2 - 2hxy + by^2 = 0$

B. $ax^2 - 2hxy - by^2 = 0$

C. $bx^2 - 2hxy + ay^2 = 0$

D. $bx^2 + 2hxy + ay^2 = 0$

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35. $3x^2 + 8xy - 3y^2 = 0$ represents a pair of lines AB and BC

$3x^2 + 8xy - 3y^2 + 2x - 4y - 1 = 0$ represents two lines CD and DA.

A. The equation of CD is ....

B. The nature of the quadrilateral ABCD is ....

C. Area of quadrilaterla is.......

D. The coordinates of point D are..........

Answer: A::C::D

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Problem Set 1 True And False

1. Each of the lines given by the equation $(x_1y - xy_1)^2 = a^2(x^2 + y^2)$ is

at a distance d from the point (x_1, y_1).

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2. The equation of the straight lines joining the orign to the points of intersection of the line $x - y = 2$ and the curve $5x^2 + 12xy - 8y^2 + 8x - 4y + 12 = 0$ are $y = \pm 2x$. Are these lines equally inclined to the axes?

3. The lines joining the origin to the points of intersection of the line $4x - 3y = 10$ with the circle $x^2 + y^2 + 3x - 6y - 20 = 0$ are mutually perpendicular.

4. The lines $y = mx$ bisects the angle between the lines $ax^2 + 2hxy + by^2 = 0$ if $h(1 - m^2) - m(a - b) = 0$.

5. The straight lines $ax^2 + 2hxy + by^2 = 0$ have the same pair of bisector as those of the lines given by $a^2x^2 + 2h(a + b)xy + b^2y^2 = 0$

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Problem Set 1 Fill In The Blanks

1. The product of the perpendicular drawn from the point (x_1, y_1) on the lines represented by $ax^2 + 2hxy + by^2 = 0$ is ....

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2. If the lines joining the origin to the points of intersection of the lines $y = mx + c$ will the circle $x^2 + y^2 = a^2$ be perpendicular then the required condition is...............

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3. The equation to the pair of lines passing through origin and perpendicular to

$2x^2 + 5xy + 2y^2 + 10x + 5y = 0$ is ....

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Problem Set 2 Multiple Choice Questions

1. If $x^2 - 3xy + \lambda y^2 + 3x - 5y + 2 = 0$ represents a pair of straight lines, then the value of λ is

A. 1

B. 4

C. 3

D. 2

Answer: D

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2. If the equation $12x^2 - 10xy + 2y^2 + 11x - 5y + \lambda = 0$ represents a pair of straight lines then $\lambda =$

A. 1

B. 2

C. 3

D. none of these

Answer: B

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3. $x^2 + k_1y^2 + 2k_2y = a^2$ represents a pair of perpendicular straight lines I

A. $k_1 = 1, k_2 = a$

B. $k_1 = 1, k_2 = -a$

C. $k_1 = -1, k_2 = -a$

D. $k_1 = -1, k_2 = a$

Answer: C::D

4. The equation $ax^2 + by^2 + \lambda x + \lambda y = 0, (\lambda \neq 0)$ represents a pair of straight lines if

A. $b + c = 0$

B. $c + a = 0$

C. $a + b = 0$

D. none of these

Answer: C

5. If $kx^2 + 10xy + 3y^2 - 15x - 21y + 18 = 0$ represents a pair of straight lines, then k=

A. 3

B. 4

C. -3

D. none of these

Answer: A

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6. The four straight lines given by the equations $12x^2 + 7xy - 12y^2 = 0$ and $12x^2 + 7xy - 12y^2 - x + 7y - 1 = 0$ lie along the sides of a

A. square

B. parallelogram

C. rectangle

D. rhombus

Answer: A

7. The equation

$$x^2y^2 - 2xy^2 - 3y^2 - 4x^2y + 8xy + 12y = 0 \text{ represents}$$

A. a pair of lines

B. a pair of lines and a circle

C. a pair of lines and a parabola

D. four lines forming a square

Answer: D

8. The three lines given by $y^3 - 9x^2y = 0$ form a triangle which is

A. equilateral

B. isosceles

C. right angled

D. none of these

Answer: D

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9. The equation $y^2 - x^2 + 2x - 1 = 0$, represents

A. a pair of straight lines

B. a circle

C. a parabola

D. an ellipse

Answer: A

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10. The quadrilatera formed by the pair of lines $xy + x + y + 1 = 0, xy + 3x + 3y + 9 = 0$ is

A. parallelogram

B. rhombus

C. rectangle

D. square

Answer: D

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11. The circumcentre of the triangle formed by the lines $xy + 2x + 2y + 4 = 0$ and $x + y + 2 = 0$ is

A. (0,0)

B. (-1,-1)

C. (-1,-2)

D. (-2,-2)

Answer: B

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12. If $xy + x + y + 1 = 0, x + ay - 3 = 0$ are concurrent then a=

A. 3

B. 4

C. 2

D. none of these

Answer: B

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13. If by rotating the axes through an angle θ the general equation of second degree

$ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ is free form the term of xy, then

$\tan 2\theta$ is

A. $\dfrac{a - b}{2h}$

B. $\dfrac{2h}{a + b}$

C. $\dfrac{a + b}{2h}$

D. $\dfrac{2h}{a - b}$

Answer: D

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14. The equation $6x^2 - xy - 12y^2 - 8x + 29y - 14 = 0$ represents a pair of lines and angle between them is

A. $\tan^{-1}\left(-\dfrac{17}{6}\right)$

B. $\tan^{-1}\left(\dfrac{3}{4}\right)$

C. $\pi/4$

D. $\pi/3$

Answer: A

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15. If the equation $2x^2 - 3xy - ay^2 + x + by - 1 = 0$ represents two perpendicular lines (a,b) is

A. (2,3)

B. (3,2)

C. (-2,3)

D. $(2, -9/2)$

Answer: A::D

16. The equation of second degree

$$x^2 + 2\sqrt{2}xy + 2y^2 + 4x + 4\sqrt{2}y + 1 = 0$$

represents a pair of straight lines, the distance between them is

A. 4

B. $4/\sqrt{3}$

C. 2

D. $2/\sqrt{3}$

Answer: C

17. The distance between pair of parallel lines

$$9x^2 - 24xy + 16y^2 - 12x + 16y - 12 = 0 \text{ is}$$

A. 5

B. 8

C. $\dfrac{8}{5}$

D. $\dfrac{5}{8}$

Answer: C

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18. The angle between the straight lines $x^2 - y^2 - 2y - 1 = 0$ is

A. $90°$

B. $60°$

C. $75°$

D. $36°$

Answer: A

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19. If the angle between the two lines represented by $2x^2 + 5xy + 3y^2 + 7y + 4 = 0$ is $\tan^{-1} m$, then m=

A. $1/5$

B. 1

C. $7/5$

D. 7

Answer: A

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20. If $x^2 - 3xy + \lambda y^2 + 3x - 5y + 2 = 0$ represents a pair of straight lines and θ is the angle between them, then $\cos ec^2 \theta =$

A. 3

B. 9

C. 10

D. 100

Answer: C

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21. The point of intersection of two lines given by

$2x^2 - 5xy + 2y^2 - 3x + 3y + 1 = 0$ is

A. $\left(\dfrac{1}{2}, \dfrac{1}{3}\right)$

B. $\left(-\dfrac{1}{7}, -\dfrac{1}{7}\right)$

C. $\left(-\dfrac{1}{3}, \dfrac{1}{3}\right)$

D. $\left(\dfrac{1}{3}, -\dfrac{1}{3}\right)$

Answer: D

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22. The equation $8x^2 + 8xy + 2y^2 + 26x + 13y + 15 = 0$ represents a pair of parallel straight lines. The distance between them is

A. $\dfrac{7}{\sqrt{5}}$

B. $\dfrac{\sqrt{7}}{5}$

C. $\dfrac{7}{2\sqrt{5}}$

D. none of these

Answer: C

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23. If the equation $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents a pair of parallel lines, then

A. $\dfrac{a}{h} = \dfrac{b}{h} = \dfrac{f}{g}$

B. $\dfrac{a}{h} = \dfrac{h}{b} = \dfrac{f}{g}$

C. $\dfrac{a}{h} = \dfrac{h}{b} = \dfrac{g}{f}$

D. none of these

Answer: C

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24. If the equation $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents a pair of parallel lines, then

A. $\sqrt{\dfrac{g^2 - ac}{h^2 + a^2}}$

B. $2\sqrt{\dfrac{g^2 - ac}{a(a + b)}}$

C. $\sqrt{\dfrac{g^2 + ac}{a(a + b)}}$

D. $2\sqrt{\dfrac{g^2 + ac}{a(a + b)}}$

Answer: B

1. Match the entries of List A and List B

List A

(a) The Lines joining the points of intersection of the line 4x-y=10 with t

(b) The two lines given $a^2x^2 + 2hxy + b^2y^2 = 0$ are such that slop of on

(c) If the equation $12x^2 - 10xy + 2y^2 + 11x - 5y + \lambda = 0$ represents a

(d) If $x^2 - 3xy + (\lambda)y^2 + 3x - 5y + 2 = 0$ represents a pair of straight

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2. Match the entries of of col. I with those of col. II.

The lines given by left hand side in col. I have the property mentioned in

col. II.

Column I	Column II
(a) $6x^2 + 5xy - 6y^2 - x + 5y - 1 = 0$	(p) parallel
(b) $30x^2 + 36xy + 8y^2 - 35x - 11y + 5 = 0$	(q) perpendicular
(c) $30x^2 + 41xy + 8y^2 - 35x - 11y + 5 = 0$	(r) $l_x = 5/6$
(d) $6x^2 + 12xy + 6y^2 - 7x - 7y + 1 = 0$	(s) $l_y = 1/6$

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Self Assessment Test

1. Separate equations of liens, for a pair of lines, whose equation is $x^2 + xy - 12y^2 = 0$ are

A. $x + 4y = 0$ and $x + 3y = 0$

B. $2x - 3y = 0$, $x - 4y = 0$

C. $x - 6y = 0$ and $x - 3y = 0$

D. $x + 4y = 0$ and $x - 3y = 0$

Answer: D

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2. The gradient of one of the lines given by $ax^2 + 2hxy + by^2 = 0$ is twice that of the other, then

A. $h^2 = ab$

B. $h = a + b$

C. $8h^2 = 9ab$

D. $9h^2 = 8ab$

Answer: C

3. The values of λ for which the equation $x^2 - y^2 - x - \lambda y - 2 = 0$ represents a pair of straight lines are

A. $3, \ -3$

B. $-3, 1$

C. $3, 1$

D. $-1, 1$

Answer: A

4. The acute angle between the lines joining the orign to points of intersection of the line $\sqrt{3}x + y = 2$ and the circle $x^2 + y^2 = 4$ is

A. $\dfrac{\pi}{4}$

B. $\dfrac{\pi}{3}$

C. $\dfrac{\pi}{2}$

D. $\dfrac{\pi}{6}$

Answer: B

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5. The angle between the lines represented by the equation $4x^2 - 24xy + 11y^2 = 0$ are

A. $\tan^{-1}\dfrac{3}{4}, \tan^{-1}\left(\dfrac{-3}{4}\right)$

B. $\tan^{-1}\dfrac{1}{3}, \tan^{-1}\left(\dfrac{-1}{3}\right)$

C. $\tan^{-1}\dfrac{4}{3}, \tan^{-1}\left(\dfrac{-4}{3}\right)$

D. none of these

Answer: C

6. Condition that the two lines represented by the equation $ax^2 + 2hxy + by^2 = 0$ to be perpendicular is

A. $ab = -1$

B. $a + b = 0$

C. $a = b$

D. $ab = 1$

Answer: B

7. Distance between two lines represented by the pair of straight lines

$$x^2 - 6xy + 9y^2 + 3x - 9y - 4 = 0 \text{ is}$$

8. The distance between the pair of parallel lines

$$x^2 + 2xy + y^2 - 8ax + 8ay - 9a^2 = 0$$

A. $2\sqrt{5}a$

B. $\sqrt{10a}$

C. $10a$

D. $5\sqrt{2}a$

Answer: D

9. The equations to a pair of opposite sides of a parallelogram are $x^2 - 5x + 6 = 0$ and $y^2 - 6y + 5 = 0$. The equations of its diagonals are

    A. $x + 4y = 13, y = 4x - 7$

    B. $4x + y = 13, 4y = x - 7$

    C. $4x + y = 13, y = 4x - 7$

    D. none of these

Answer: C

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10. If the bisectors of the lines $x^2 - 2pxy - y^2 = 0$ be $x^2 - 2qxy - y^2 = 0$ then

    A. $pq + 1 = 0$

    B. $pq - 1 = 0$

C. $p + q = 0$

D. $p + q = 1$

Answer: A

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