

Twenty-third Set of Homework

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Due: Monday April 11

Please note: You should fully justify your answers.

Circles and lines

Common points of circles and lines

1. Find the common points of the circle C and the line l :

(a) $C: x^2 + y^2 = 7, l: x = 2$

(b) $C: (x - 2)^2 + (y - 4)^2 = 10, l: y = x - 2$

(c) $C: (x - 3)^2 + (y + 2)^2 = 10, l: x + y = 10$

(d) $C: (x - 3)^2 + (y + 2)^2 = 4, l: x + y = 10$

(e) $C: (x + 1)^2 + (y - 3)^2 = 5, y = 2 * x$

(f) $C: x^2 + 2x + y^2 + 2y = -1, l: x + y = -1$

(g) $C: x^2 + 4x + y^2 + 6y = -9, l: y = -3x$

(h) $C: x^2 - 4x + y^2 - 8y = -10, l: y = -x + 4$

(i) $C: x^2 + y^2 = 10, l: y - x = 2$

(j) $C: x^2 + y^2 = 29, l: y = 2x + 1$

(k) $C: x^2 + 2x + y^2 - 6y = -8, l: y - x = 4$

Lines tangent to circles

1. After verifying that the given point P lies on the given circle C , find an equation for the line tangent to C at P .

(a) $P(-1, -2), C: (x - 1)^2 + (y - 3)^2 = 5$

(b) $P(1, -3), C: (y + 5)^2 + (x + 4)^2 = 29$

(c) $P(1, -1), C: x^2 - 8x + y^2 = -6$

(d) $P(2, -3), C: x^2 + 4x + y^2 - 6y = 39$

(e) $P\left(\frac{1}{2}, -\frac{3}{2}\right), C: x^2 = y^2 = \frac{5}{2}$

(f) $P(\sqrt{2}, -\sqrt{2}), C: x^2 + y^2 = 4$

2. The line with equation $y = 3x$ is tangent to a circle centered at $(4, 2)$. Find the equation of the circle and the point that the line is tangent to the circle.

3. A line passing through the origin is tangent to the circle $x^2 + 10x + y^2 = -20$. Find the equation of the line.