

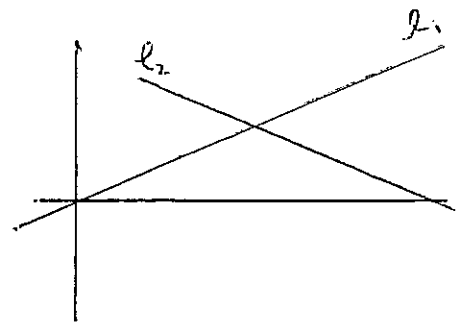
Meet 2: Analytic Geometry of Lines and Circles

Slope, families of parallel, perpendicular, or coincident lines

Point-slope, slope-intercept, double-intercept, normal forms of lines

Intersections (Systems of Simultaneous Equations)

1. Line l is tangent to $(x-3)^2 + (y-1)^2 = r^2$ at $(1, 2)$.
 - a) Find r .
 - b) Where does l cross the y -axis?
2. A circle centered in the first quadrant passes through the origin and is tangent to both $y = x + 4$ and $y = x - 4$. What are the coordinates of the center of the circle?
3. Lines l_1 and l_2 , together with the positive x -axis, enclose an isosceles triangle of area 4. The equation of l_1 is $x - 3y = 0$. Find the equation of l_2 .



4. Find all points (x, y) that simultaneously satisfy $(x+3)^2 + (y-5)^2 = 65$ and $2x - 3y = 5$.

These problems
are from
the 1990 meet

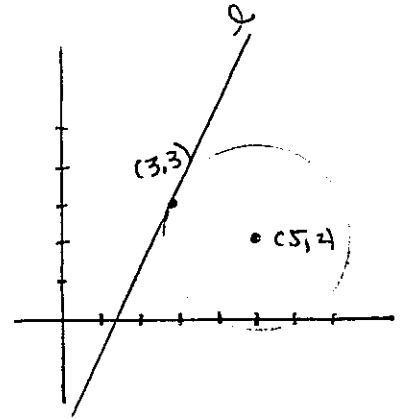
5. The point $T(0,6)$ is on the rim of the circle described by $x^2 + (y-3)^2 = 9$. Imagine that this circle, with T fixed on the rim, is rolled along the positive x -axis until T sits on the x -axis. What is the equation of the circle in this new position?

6. A line l is tangent at $(3,3)$ to a circle centered at $(5,2)$.

a) Write the equation of the circle.

b) Write the equation of the line.

c) Suppose the circle is rolled along line l until its center is on the x -axis. At what two points will the circle cut the x -axis?



7. Is the point $P(223, 128)$ in the half-plane above or the half-plane below the graph of $97x - 173y + 519 = 0$?

Answer Key

1. a) $\sqrt{5}$ b) $(0,0)$ or $y=0$ 2. $(2,2)$ 3. $x+3y=4\sqrt{3}$ or an equivalent form 4. $(-2,-3), (4,1)$

5. $(x-3\pi)^2 + (y-3)^2 = 9$ 6. a) $(x-5)^2 + (y-2)^2 = 5$ b) $y = 2x - 3$ c) $(4+\sqrt{5}, 0), (4-\sqrt{5}, 0)$ 7. below