5th Year - Hons Maths.

Problem Set 7 – The Circle

[2008]

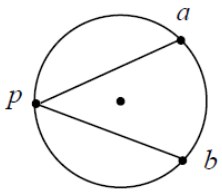
1. (a) A circle with centre $(-3, 2)$ passes through the point $(1, 3)$. Find the equation of the circle.

(b) A tangent is drawn to the circle $x^2 + y^2 = 13$ at the point $(2, 3)$. This tangent crosses the x-axis at $(k, 0)$. Find the value of k.

(c) A circle passes through the points $A(8, 5)$ and $B(9, -2)$. The centre of the circle lies on the line $2x - 3y - 7 = 0$.

(i) Find the equation of the circle.

(ii) P is a point on the major arc ab of the circle. Show that $|\angle apb| = 45°$



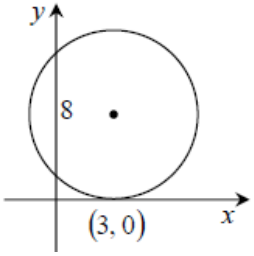
[2007]

2. (a) $x^2 + y^2 - 4x - 6y + 5 = 0$ and $x^2 + y^2 - 6x - 8y + 23 = 0$ are two circles.

(i) Prove that the circles touch internally.

(ii) Find the coordinates of the point of contact of the two circles.

(b) A circle has its centre in the first quadrant. The x-axis is a tangent to the circle at the point $(3, 0)$. The circle cuts the y-axis at points that are 8 units apart. Find the equation of the circle.



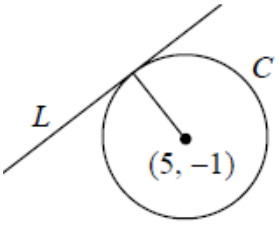
[2006]

3. (a) $A(-1, -3)$ and $B(3, 1)$ are the end-points of a diameter of a circle. Write down the equation of the circle.

(b) Circle c has centre $(5, -1)$. The line l: $3x - 4y + 11 = 0$ is a tangent to c.

(i) Show that the radius of c is 6.

(ii) The line $x + py + 1 = 0$ is also a tangent to c. Find two possible values of p.



(c) The circle s is $x^2 + y^2 + 4x + 4y - 17 = 0$ and k is the line $4x + 3y = 12$.

(i) Show that the line k does not intersect s.

(ii) Find the co-ordinates of the point on s that is closest to k.

[2004]

4. (a) A circle has centre $(-1, 5)$ and passes through the point $(1, 2)$. Find the equation of the circle.

(b) The point $A(5, 2)$ is on the circle k: $x^2 + y^2 + px - 2y + 5 = 0$.

(i) Find the value of p.

(ii) The line l : $x - y - 1 = 0$ intersects the circle k. Find the co-ordinates of the points of intersection.

(c) The y-axis is a tangent to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$.

(i) Prove that $f^2 = c$.

(ii) Find the equations of the circles that pass through the points $(-3, 6)$ and $(-6, 3)$ and have the y-axis as a tangent.