Tangent and Normal of Circle

1. Show that the circles $x^2 + y^2 - 2x + 4y + 3 = 0$ and $x^2 + y^2 - 8x - 2y + 9 = 0$ touch one another at $(2, -1)$.

2. Find the equation of the circle through the intersection of the circles $x^2 + y^2 - 9x + 14y - 7 = 0$ and $x^2 + y^2 + 15x + 14 = 0$ and passes through the point $(2, 5)$.

3. Find the equation of the circle through the intersection of the circles $x^2 + y^2 = 1$ and $x^2 + y^2 + 2x + 4y + 1 = 0$ which touches the straight line $x + 2y + 5 = 0$.

4. Find the equation of the tangent to the circle $x^2 + y^2 - 4x + 6y - 3 = 0$ which are parallel to the straight line $3x - 4y + 1 = 0$.

5. If the two circles $x^2 + y^2 + 2gx + 2fy = 0$ and $x^2 + y^2 + 2g_1x + 2f_1y = 0$ touch each others show that $f_1g = fg_1$.

6. For what values of k does the straight line $4x + ky + 7 = 0$ touch the circle $x^2 + y^2 - 6x + 4y - 12 = 0$.

7. Find the radical center of the three circles $x^2 + y^2 + x + 2y + 3 = 0$, $x^2 + y^2 + 2x + 4y + 5 = 0$ and $x^2 + y^2 - 7x - 8y - 9 = 0$.