Tangents and Normals

1) The curve C has equation $y = x^2 - 4x + 7$

a) Find the equation of the tangent to C at (1,4)
b) Find the equation of the normal to C at (1,4)

2) Find the equation of the tangent to the curve $y = \frac{16}{x} + 3x + 2$ at the point (4,18)

3) The curve $y = 2x^2 - 10x + 16$. Point P has coordinates (3,4). Find the equation of the tangent at P.

4) Find the equation of the normal to the curve $y = 3x^2 - 8x + 7$ when $x = 2$

5) The curve C has equation $y = x^2 - 9x + 13$

(a) Find the equation of the tangent at (6,-5)
(b) Point Q lies on C such that the gradient of the normal to C at Q is $\frac{1}{7}$

Find the x coordinate of Q

6) Find the equation of the tangent to the curve $y = 2x^2 + 6x + 7$ at the point with $x = -1$.

7) Find the equation of the normal to the curve $y = \frac{6}{x^2} + \frac{7x}{4} - 2$ at the point (2,3)

8) The curve C has equation $y = x^2 - 8x + 10$

a) The point P has coordinates (3,-5) and lies on C. Find the equation of the normal to C at P.

b) The point Q lies on C and is such that the tangent to C at Q has equation

$y = 4x + c$ where c is a constant

Find the coordinates of Q and the value of c

9) The curve C has equation $y = 3x^2 - 9x + 1$

Find the equation of the tangent to C at the point when $x = 2$

10) Find the equation of the normal to the curve

$$y = 2x^2 - 8x + 13$$

at the point with x value of 3.

11) The curve C has equation $y = x^2 - 6x + 7$

a) The point P, whose x coordinate is 5, lies on the curve. Find the equation of the tangent to C at P.

b) The line L has equation $y = \frac{1}{2}x - 2$

Find the 2 intersection points of C and L.
Show that L is in fact the normal to C at one of the intersection points.

12) Find the equation of the tangent to the curve

$$y = 3x^2 - 14x + 13$$

when $x = 3$.

13) The curve C has equation $y = 2x^2 - 11x + 13$

a) Find the equation of the tangent to C at P(2, -1)

b) The point Q lies on C such that the gradient of the normal to C at Q is $-\frac{1}{9}$. Find the value of Q.

14) The curve C is $y = ax^2 + bx + 1$

At the point (1,3) the gradient of the normal is -1

Calculate the values of a and b.