Past Examination Questions

Tangents and Normals

Part 5.

1. A curve has an equation of the form $y = px + \frac{q}{x}$, where p and q are constants. Given that the curve passes through the points $A(1, 11)$ and $B(4, 21\frac{1}{2})$, (i) evaluate p and q, (ii) obtain the equation of the tangent to the curve at the point where $x = 2$, (iii) show that this tangent is parallel to AB. (N91/P1/11a)
2. Find the equation of the tangent to the curve $2x^3 + 3y^3 + 5xy - 3 = 0$ at the point $(2, -1)$. (N92/P2/5c)
3. Find the equation of the normal to the curve $y = 3x^2 - 8x + 7$ at the point where $x = 2$. (J93/P1/1)
4. The tangent to the curve $y = px^3$ at the point where $x = 2$ passes through the point $(1, -10)$. Find the value of p. (N93/P1/7)
5. The tangent to the curve $y = 4x + \frac{8}{x}$ at the point $(2, 12)$ meets the x-axis at A and the y-axis at B. Find the co-ordinates of the mid-point of AB. (J94/P1/2)
6. The tangent to the curve $y = \left(\frac{x}{2} - 1\right)^6$, at the point where $x = 4$, meets the y-axis at A. Find the co-ordinates of A. (N94/P1/3)
7. Find the equation of the normal to the curve $y = 6 - (x - 2)^4$ at the point on the curve where $x = 1$. (J95/P1/2)
8. Find the equation of the tangent to the curve $x^2 + 5y^2 + 2xy = 4$ at the point $(1, -1)$. (J95/P2/4b)
9. The equation of a curve is $y = (3 - x^2)^6$. Find (i) $\frac{dy}{dx}$, (ii) the equation of the normal at the point on the curve where $x = 2$. (N95/P1/5)
10. A curve has the equation $y = 2x^2 - 5x + 3$. Find (i) the x-coordinate of the minimum point, (ii) the equation of the normal to the curve at the point where $x = 2$. (J96/P1/3)

1. (i) $p = 5, q = 6$

(ii) $2y = 7x + 12$

(iii) gradients are $3\frac{1}{2}$

2. $x + y = 1$
3. $x + 4y = 14$
4. $2\frac{1}{2}$.
5. $(-2, 4)$
6. $(0, -11)$
7. $4y = 21 - x$
8. $y = -1$
9. (i) $12(x^3 - 3)^5$

(ii) $24y = 26 - x$

10. (i) $1\frac{1}{4}$ (ii) $39 + x = 5$