SECOND DERIVATIVES

CANSU OLCE

A STAR MATHS (www.astarmaths.com.au)

1. $y = x^3 - 5x^2 + 6x - 7$
$\frac{d^2y}{dx^2} = ?$

2. $y = 3x^2 + \frac{1}{x}$
$\frac{d^2y}{dx^2} = ?$

3. $y = \frac{4 + x^2}{2x}$
$\frac{d^2y}{dx^2} = ?$

4. $y = \frac{1}{2(3 - 4x)}$
$\frac{d^2y}{dx^2} = ?$

5. $f(x) = \left(2 - \frac{x}{2}\right)^4$
$f''(8) = ?$

6. $y = x^3 - 5x^2 + 3x - 7$
Find the values of $\frac{d^2y}{dx^2}$ when $\frac{dy}{dx} = 0$.

7. Given that $y = (2x - 1)^2$, find the value of x which satisfies the equation
$\frac{d^2y}{dx^2} + x\frac{dy}{dx} - 2y = 0$

8. Given that $y = x^2(x-3)$, find the values of x which satisfy the equation $x^2\frac{d^2y}{dx^2} - \frac{dy}{dx} - 6y = 0$.

9. Find the turning points of the curve $y = x^3 - 3x^2 - 9x + 5$. Hence, determine whether each turning point is a maximum and minimum.

10. Find the x-coordinates of the turning points of the curve $y = 2x + \frac{2}{x-1}$. Hence, determine whether each turning point is a maximum or minimum.

11. The curve $y = x^3 + px^2 + q$ passes through point (0, 5) and has a turning point at x=-1.
    a) Find the values of p and q.
    b) Determine whether the turning point at x=-1 is a maximum or minimum point.
    c) Find the x-coordinate of another turning point of the curve and determine whether it is a maximum or minimum point.

12. $f(x) = (4+3x)^9$
    $f''(x) = ?$

ANSWERS

1. $6x - 10$
2. $6 + \frac{2}{x^3}$
3. $\frac{4}{x^3}$
4. $\frac{16}{(3-4x)^2}$
5. 12
6. -8, 8
7. x=-3/2
8. x=0, -2/3
9. (-1, 10) max
   (3,-22) min
10. x=0 max
    x=2 min
11. a) p=3/2, q=5
    b) max point
    c)x=0 min point
12. $648(4 + 3x)^7$