Name:

Level 2 Further Maths

Second Derivative $\frac{d^2y}{dx^2}$

Corbettmaths

Ensure you have: Pencil or pen

Guidance

1. Read each question carefully before you begin answering it.
2. Check your answers seem right.
3. Always show your workings

Revision for this topic

www.corbettmaths.com/more/further-maths/

1. $y = x^3 - 2x^2$

Work out $\frac{d^2y}{dx^2}$

$\frac{dy}{dx} = 3x^2 - 4x$

$\frac{d^2y}{dx^2} = 6x - 4$

.....

(2)

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2. $y = x^4 + 5x$

Work out $\frac{d^2y}{dx^2}$

$\frac{dy}{dx} = 4x^3 + 5$

$\frac{d^2y}{dx^2} = 12x^2$

.....

(2)

3. $y = x^4 + 3x^3 - 6x^2 + x$

Work out the value of $\frac{d^2y}{dx^2}$ when $x = 1$

$\frac{dy}{dx} = 4x^3 + 9x^2 - 12x + 1$

$\frac{d^2y}{dx^2} = 12x^2 + 18x - 12$

when $x = 1$

$\frac{d^2y}{dx^2} = 12 + 18 - 12$

18

(3)

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4. $y = 4x^3 - 2x^2 + x$

Work out the value of $\frac{d^2y}{dx^2}$ when $x = 2$

$\frac{d^2y}{dx^2} = 12x^2 - 4x + 1$

$\frac{d^2y}{dx^2} = 24x - 4$

when $x = 2$

$\frac{d^2y}{dx^2} = 48 - 4$

44

(3)

5. $y = x^3 - 2x^2$

Work out the value of $\frac{d^2y}{dx^2}$ when $x = -3$

$\frac{dy}{dx} = 3x^2 - 4x$

$\frac{d^2y}{dx^2} = 6x - 4$

when $x = -3$

$\frac{d^2y}{dx^2} = -18 - 4$

-22

.....

(3)

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6. $y = \frac{2}{3}x^6 - \frac{1}{2}x^4$

Work out the value of $\frac{d^2y}{dx^2}$ when $x = -1$

$\frac{dy}{dx} = 4x^5 - 2x^3$

$\frac{d^2y}{dx^2} = 20x^4 - 6x^2$

when $x = -1$

$\frac{d^2y}{dx^2} = 20 - 6$

14

.....

(3)

7. $y = \dfrac{4x^6 - x^5}{2x}$

Work out $\dfrac{d^2y}{dx^2}$

$y = 2x^5 - \frac{1}{2}x^4$

$\frac{dy}{dx} = 10x^4 - 2x^3$

$\frac{d^2y}{dx^2} = 40x^3 - 6x^2$

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8. $y = (x^2 + 5)(2 - x)$

Work out the value $\dfrac{d^2y}{dx^2}$ when $x = -2$

$y = 2x^2 - x^3 + 10 - 5x$

$y = 2x^2 - x^3 - 5x + 10$

$\frac{dy}{dx} = 4x - 3x^2 - 5$

$\frac{d^2y}{dx^2} = 4 - 6x$

when $x = -2$

$\frac{d^2y}{dx^2} = 4 - -12$

16

.....

(4)

9. $y = ax^3 - x^2$

Given $\frac{d^2y}{dx^2} = -23$ when $x = -\frac{1}{2}$

$\frac{dy}{dx} = 3ax^2 - 2x$

$\frac{d^2y}{dx^2} = 6ax - 2$

when $x = -\frac{1}{2}$

$\frac{d^2y}{dx^2} = -3a - 2$

$-3a - 2 = -23$

$+2 \quad +2$

$-3a = -21$

$a = 7$

.....

(4)