2.5 Answers

2.5.1 Solutions (2.2 Teaching Video)

(i) $y = 7x^4 + 3x^2 \quad \therefore \quad \frac{dy}{dx} = 28x^3 + 6x$

(ii) $y = \frac{1}{2}x^8 - \frac{3}{4}x^6 \quad \therefore \quad \frac{dy}{dx} = 4x^7 - \frac{9}{2}x^5$

(iii) $y = 5 \quad \therefore \quad \frac{dy}{dx} = 0$

(iv) $y = 7x \quad \therefore \quad \frac{dy}{dx} = 7$

(v) $y = \frac{2}{3}x + \frac{1}{3} \quad \therefore \quad \frac{dy}{dx} = \frac{2}{3}$

(vi) $y = 3x^7 - x^5 + 0.2x + 3 \quad \therefore \quad \frac{dy}{dx} = 21x^6 - 5x^4 + 0.2$

[6 marks]

2.5.2 Solutions (2.3 Exercise)

Answer 1

(i) $y = 6x \quad \therefore \quad \frac{dy}{dx} = 6$

(ii) $y = 4x + 5 \quad \therefore \quad \frac{dy}{dx} = 4$

(iii) $y = -3x + 17 \quad \therefore \quad \frac{dy}{dx} = -3$

(iv) $y = 3 - 17x \quad \therefore \quad \frac{dy}{dx} = -17$

(v) $y = 4x^2 \quad \therefore \quad \frac{dy}{dx} = 8x$

(vi) $y = 3x^2 - 7x \quad \therefore \quad \frac{dy}{dx} = 6x - 7$

(vii) $y = 6x^2 + 2x - 5 \quad \therefore \quad \frac{dy}{dx} = 12x + 2$

(viii) $y = 10 - 5x - 3x^2 \quad \therefore \quad \frac{dy}{dx} = -5 - 6x$

[16 marks]

Answer 2

$f(x) = \frac{3}{2}x^2 - \frac{5}{2}x^4 \quad \therefore \quad f'(x) = 3x - 10x^3$

[2 marks]

Answer 3

$$g(x) = \frac{4}{3}x^6 + \frac{2}{3}x^2 - \frac{5}{6} \qquad \therefore \quad g'(x) = 8x^5 + \frac{4}{3}x$$

[2 marks]

Answer 4

$$h(x) = \frac{3}{4}x^2 + \frac{1}{4}x + 2 \qquad \therefore \quad h'(x) = \frac{3}{2}x + \frac{1}{4}$$

[2 marks]

Answer 5

(i) $y = 2x^3 \qquad \therefore \quad \frac{dy}{dx} = 6x^2$

(ii) $y = 4x^3 + x + 1 \qquad \therefore \quad \frac{dy}{dx} = 12x^2 + 1$

(iii) $y = 7x - 5x^3 \qquad \therefore \quad \frac{dy}{dx} = 7 - 15x^2$

(iv) $y = 4x^2 - 9x^4 \qquad \therefore \quad \frac{dy}{dx} = 8x - 36x^3$

(v) $y = 10x^6 - 12x^5 \qquad \therefore \quad \frac{dy}{dx} = 60x^5 - 60x^4$

(vi) $y = x^2(10 - 7x)$

$y = 10x^2 - 7x^3 \qquad \therefore \quad \frac{dy}{dx} = 20x - 21x^2$

(vii) $y = (x + 4)(2x - 7)$

$y = 2x^2 + x - 28 \qquad \therefore \quad \frac{dy}{dx} = 4x + 1$

(viii) $y = (x^2 - 3)(2x - 1)$

$y = 2x^3 - x^2 - 6x + 3 \qquad \therefore \quad \frac{dy}{dx} = 6x^2 - 2x - 6$

[16 marks]

Answer 6

$$p(x) = \frac{4}{x} \Rightarrow p(x) = 4x^{-1}$$

$$\therefore \quad p'(x) = -4x^{-2} \Rightarrow p'(x) = -\frac{4}{x^2}$$

[2 marks]

Answer 7

$$q(x) = \frac{10}{x^2} \Rightarrow q(x) = 10x^{-2}$$

$$\therefore\ q'(x) = -20x^{-3} \Rightarrow q'(x) = -\frac{20}{x^3}$$

[2 marks]

Answer 8

$$v(x) = 4x - \frac{5}{x} \Rightarrow v(x) = 4x - 5x^{-1}$$

$$\therefore\ v'(x) = 4 + 5x^{-2} \Rightarrow v'(x) = 4 + \frac{5}{x^2}$$

[2 marks]

Answer 9

$$w(x) = 3x^3 + \frac{2}{x^3} \Rightarrow w(x) = 3x^3 + 2x^{-3}$$

$$\therefore\ w'(x) = 9x^2 - 6x^{-4} \Rightarrow w'(x) = 9x^2 - \frac{6}{x^4}$$

[3 marks]

Answer 10

$$e(x) = \frac{1}{4x} \Rightarrow e(x) = \frac{1}{4}x^{-1}$$

$$\therefore\ e'(x) = -\frac{1}{4}x^{-2} \Rightarrow e'(x) = -\frac{1}{4x^2}$$

[3 marks]

Answer 11

$$k(x) = \frac{3}{4x^2} + 5 \Rightarrow k(x) = \frac{3}{4}x^{-2} + 5$$

$$\therefore\ k'(x) = -\frac{6}{4}x^{-3} \Rightarrow k'(x) = -\frac{3}{2x^3}$$

[3 marks]

Answer 12

$$m(x) = \frac{5}{2x} - \frac{3}{2x^2} \Rightarrow m(x) = \frac{5}{2}x^{-1} - \frac{3}{2}x^{-2}$$

$$\therefore\ m'(x) = -\frac{5}{2}x^{-2} + 3x^{-3} \Rightarrow m'(x) = -\frac{5}{2x^2} + \frac{3}{x^3}$$

[3 marks]