No. :

Date :

Checked 9/8/18

Model Exam Paper Question 7

a) Find $\frac{dy}{dx}$ for each of the following.

i) $y = 6$

$\frac{dy}{dx} = 0$ ✓

ii) $y = 5x$

$\frac{dy}{dx} = 5$ ✓

iii) $y = -3x^4$

$\frac{dy}{dx} = -3(4)x^{4-1}$

$= -12x^3$ ✓

iv) $y = \frac{5}{x}$ ✓

$= 5x^{-1}$

$\frac{dy}{dx} = 5(-1)x^{-1-1}$

$= -5x^{-2}$

$= -5\left(\frac{1}{x^2}\right)$

$= \frac{-5}{x^2}$ ✓

v) $y = -\frac{2}{3x^3}$

$= \frac{2}{3}x^{-3}$

$-\frac{2}{3x^3} = -\frac{2}{3}x^{-3}$

$\frac{dy}{dx} = -\frac{2}{3}(-3)x^{-3-1}$ ✓

$= 2x^{-4}$ ✓

$= 2\left(\frac{1}{x^4}\right)$ ✓

$= \frac{2}{x^4}$ ✓

b) Differentiate each of the following functions:

i) $y = -8x^4 - 3x + 5$

$\frac{dy}{dx} = -8(4)x^{4-1} - 3$

$= -32x^3 - 3$ ✓

ii) $y = \frac{1}{x^3} + 4x^2 - 3x - 1$

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

$= 1(-3)x^{-3-1} + 8x - 3$

$= -3x^{-4} + 8x - 3$

$= -3\left(\frac{1}{x^4}\right) + 8x - 3$

$= \frac{-3}{x^4} + 8x - 3$ ✓

iii) $y = 5 - 2x + 3x^2 - \frac{1}{x}$

$\frac{dy}{dx} = -2 + 3(2)x^{2-1} - x^{-1}$

$= -2 + 6x - 1(-1)x^{-1-1}$

$= -2 + 6x + x^{-2}$

$= -2 + 6x + \frac{1}{}$ ✓

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c. Determine the differentiation for the following functions

i. $y = x(2x)$

$= 2x^2$

$\frac{dy}{dx} = 2(2)x^{2-1}$

$= 4x$ ✓

ii) $y = x(3x + 2)$

$= 3x^2 + 2x$

$\frac{dy}{dx} = 3(2)x^{2-1} + 2$

$= 6x + 2$ ✓

iii) $y = -x(2 - x)$

$= -2x + x^2$

$\frac{dy}{dx} = -2 + 1(2)x^{2-1}$

$= -2 + 2x$ ✓

iv) $y = \frac{3x^2 + 2x - 1}{x^2}$

$= \frac{3x^2}{x^2} + \frac{2x}{x^2} - \frac{1}{x^2}$

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

$= 3 + 2x^{-1} - x^{-2}$

$= 3 + 2(-1)x^{-1-1} - 1(-2)x^{-2-1}$

$= 3 - 2x^{-2} + 2x^{-3}$

$= 3 - 2\left(\frac{1}{x^2}\right) + 2\left(\frac{1}{x^3}\right)$

$= 3 - \frac{2}{x^2} + \frac{2}{x^3}$ ✓

v. $y = \frac{x(x-2)}{3}$

$= \frac{x^2 - 2x}{3}$

$= \frac{x^2}{3} - \frac{2x}{3}$

$\frac{dy}{dx} = \frac{1}{3}(2)x^{2-1} - \frac{2}{3}$

$= \frac{2}{3}x - \frac{2}{3}$ ✓