

(C1-7.4a) Name:

Homework Questions 4 – Using Standard Results to Differentiate

1. Use standard results to differentiate the following

a) $y = x^3 + 2x^2$

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

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

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

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

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

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

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

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

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

f) $y = 3x^2 - 2x^{-1} + 5$

$$\frac{dy}{dx} = 6x^2 + 2x^{-2}$$

g) $y = 6x^2 + \frac{x}{2} - 2$

$$\frac{dy}{dx} = 12x + 0.5$$

h) $y = 8x^2 + 4x - 3$

$$\frac{dy}{dx} = 16x + 4$$

i) $y = 2x^2 + 3x - 1$

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

J) $y = 6x^2 + 2x + 4$

$$\frac{dy}{dx} = 12x + 2$$

2. Find the gradient of the following curves at the given points

a) $f(x) = \frac{1}{x^2}$ at the point (2, 0.25)

$$-\frac{1}{4}$$

b) $f(x) = \frac{5}{\sqrt{x}}$ at the point where $x=9$

$$-\frac{5}{54}$$

3. Find the coordinate of the point on the curve

a) $y = x^2 - 3x + 1$ where the gradient is 7

$$(5, 11)$$

b) $f(x) = 4x^2 - 7x + 3$ where the gradient is -3

$$(0.5, 0.5)$$

c) $f(x) = x^2 + 5x + 3$ where the gradient is 1

$$(-2, -3)$$

d) $y = 7x - 3x^2$ where the gradient is -5

$$(2, 2)$$

4. Find the coordinate of both points on the curve $y = x - \frac{x^3}{3}$ where the gradient is 0

$$(1, 2/3) \quad (-1, -2/3)$$

5. Find the coordinate of both points on the curve $y = x^3 - 9x^2 + 10x - 5$ where the gradient is -14

$$(4, -45) \quad (2, -13)$$