

3055 BA SANGAM COLLEGE

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Worksheet 22

School: Ba Sangam College	Year / Level: <u>13</u>
Subject: Mathematics	Name of student:

Strand	8 - Differentiation
Sub strand	8.1 - Derivatives of functions
Content Learning Outcome	Differentiate using rules

Derivatives of Functions

Ref. Yr 13 Mathematics Textbook pg. 187 - 189

Common Derivatives

ightharpoonup To differentiate, $y = kx^n$, multiply the coefficient k by the power n and then reduce the power by one.

$$y = x^{n}$$

$$y' \text{ or } \frac{dy}{dx} = n \cdot x^{n-1}$$

$$f'(x) = (n \times a)x^{n-1}$$

 $f(x) = ax^n$

- > Derivative of a constant is equal to zero.
- $y=e^x$ has a special property that its derivative is the function itself.

$$y = e^x$$

$$\frac{dy}{dx} = e^x$$

> Derivatives of trigonometric and logarithmic functions

y=f(x)	$\frac{dy}{dx}$ or $f'(x)$
ln x	$\frac{1}{x}$
$\sin x$	cos x
$\cos x$	$-\sin x$
tan x	$\sec^2 x$

- **§** Example 1 Find the derivative of $f(x) = x^2 1$

$$f(x) = x^{2} - 1$$

$$f'(x) = 2x^{2-1} - 0$$

=2x

- **§** Example 2 Differentiate $g(x) = 3x^2 + \sqrt[3]{x}$
- **∠** Answer

$$g(x) = 3x^{2} + x^{\frac{1}{3}}$$

$$g'(x) = 3 \times 2 x^{2-1} + \frac{1}{3} x^{\frac{1}{3}-1}$$

$$= 6 x + \frac{1}{3} x^{-\frac{2}{3}}$$

- **9** Example 3 Find the derivative of $y = 4x^2 + 3e^x$

Differentiate term by term

Power rule exponential
$$y = 4x^{2} + 3e^{x}$$

$$y' = 4 \times 2x^{2-1} + 3e^{x}$$

$$= 8x + 3e^{x}$$

§ Example 4 Find the derivative of $y=\sin x+\ln x$

Differentiate term by term

$$y = \sin x + \ln x$$

$$y' = \cos x + \frac{1}{x}$$

ACTIVITY: Find the derivative of the following:

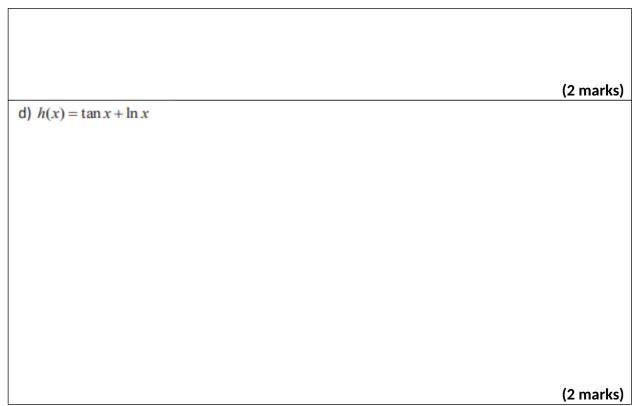
a)
$$y = \frac{1}{x^2} + 3\sqrt{x} - 20$$

(2 marks)

b)
$$g(x) = \frac{1}{3x^3} - 5\cos x$$

(2 marks)

c)
$$f(x) = 3x^2 + e^x - 42$$



THE END