



Course 12 Methods Year 12

Student name: \_\_\_\_\_  
Teacher name: \_\_\_\_\_

Task type: Response

Time allowed for this task: 40 mins

Number of questions: 7

Materials required: No calculators nor classpads

Standard items: Pens (blue/black preferred), pencils (including coloured), sharpener, correction fluid/tape, eraser, ruler, highlighters

Special items: Drawing instruments, templates, notes on one unfolded sheet of A4 paper, and up to three calculators approved for use in the WACE examinations

Marks available: 40 marks

Task weighting: 10 %

Formula sheet provided: Yes

Note: All part questions worth more than 2 marks require working to obtain full marks.

Q1 (2, 3 &amp; 3 = 8 marks) (3.1.7-3.1.8)

Determine  $\frac{dy}{dx}$  for each of the following. (No need to simplify)

a)  $y = \frac{3}{x}$

b)  $y = (3x^2 + 4x)(5x - 1)$

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

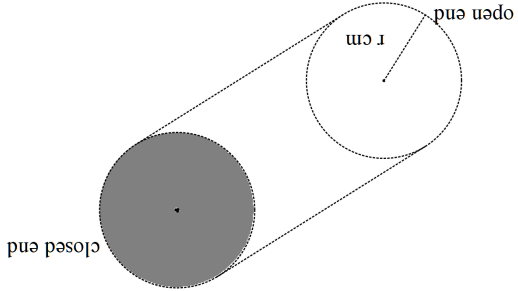
Q2 (2 &amp; 3 = 5 marks) (3.1.8)

Consider  $f(x) = (4x - 2)^5$ .

a) Determine  $f'(0)$

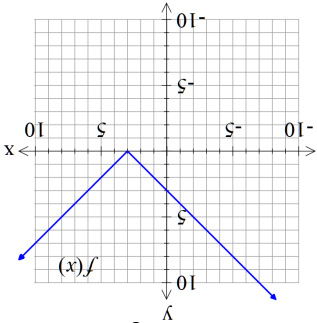
b) Determine the equation of the tangent at  $x = 0$

.Q7 (4 marks) (3.1.16)  
Consider a hollow cylindrical container that has one open end. The surface area of the container is  $50\text{cm}^2$ . Determine the **exact** value of the radius of the closed end that maximises the volume. (Justify) (Hint- refer to formula sheet)



Total surface area  $50\text{cm}^2$

Q3 (1, 1, 3 & 3 = 8 marks) (3.1.7-3.1.8, 3.1.15)  
Consider the following functions  $f$  &  $g$ .

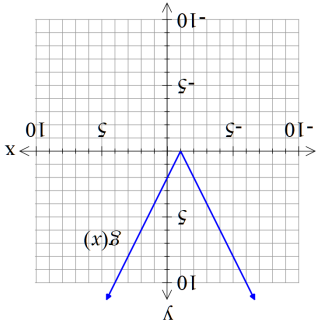


a) Determine the derivative of  $f(x)$  when  $x = -2$

b) Determine the derivative of  $3g(x)$  when  $x = 0$

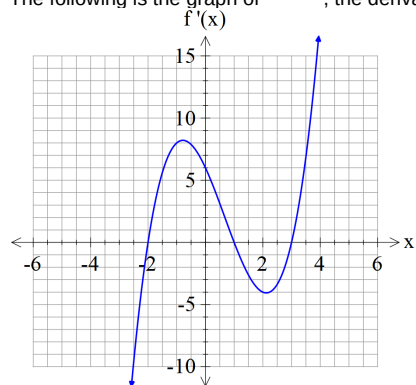
c) Determine the derivative of  $f(x)g(x)$  when  $x = 0$ .

d) Determine the derivative of  $f(g(x))$  when  $x = 0$ .



Q4 (2, 3 &amp; 2 = 7marks) (3.1.13 – 3.1.17)

The following is the graph of  $f'(x)$ , the derivative of  $f(x)$ .



a) State the  $x$  values of all stationary points of  $f(x)$ .

b) State the nature of each stationary point above and justify.

c) State approximate  $x$  value for an inflection point(s) and explain why.

Q5 (3 &amp; 2 = 5 marks) (3.1.12)

The displacement of a body from the origin O, at time  $t$  seconds, is  $x$  metres where

$$x = \frac{t^3}{3} - \frac{5t^2}{2} + 6t + 1$$

a) Determine the time(s) that the velocity is zero metres/second.

b) Determine when the acceleration is zero.

Q6 (3 marks) (3.1.10)

The period  $T$  of a swinging pendulum of length  $l$  is given by  $T = 2\pi\sqrt{\frac{l}{10}}$ .

Using the increments formula, determine the approximate percentage change in  $T$  if  $l$  changes by 3%