PERTH MODERN SCHOOL
Exceptional schooling. Exceptional students.
Independent Public School

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 & 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 & 3 = 5 marks) (3.1.8)

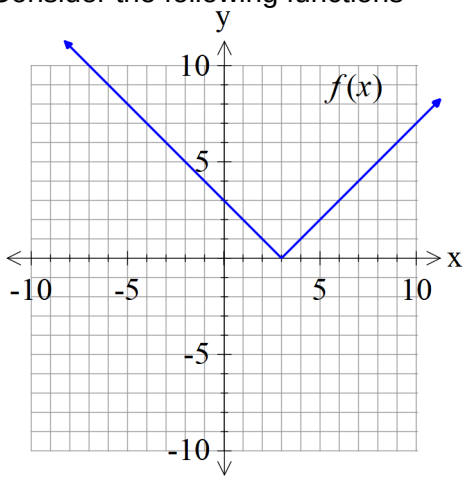
Consider $f(x) = (4x - 2)^5$.

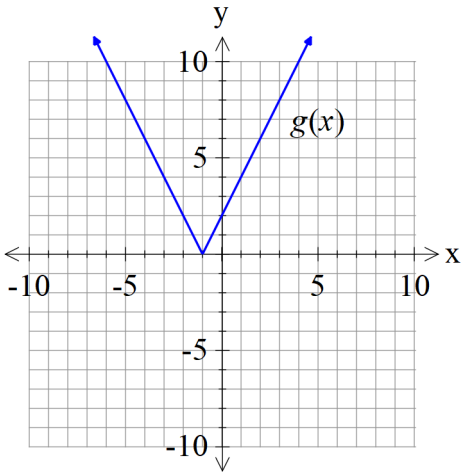
a) Determine $f'(0)$

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

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 $x = -2$

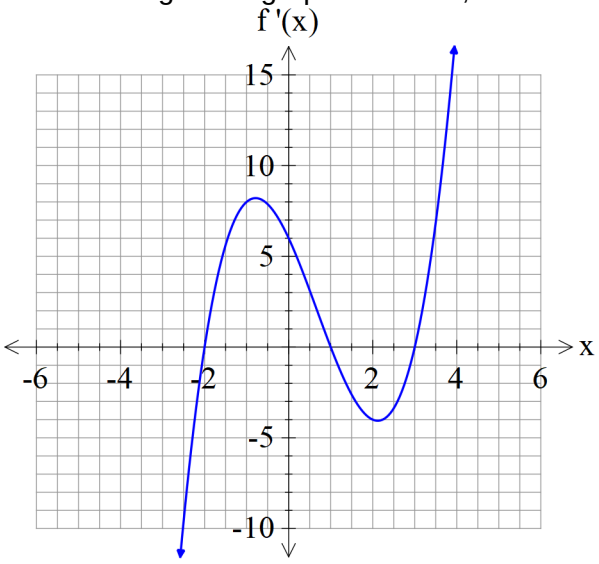
b) Determine the derivative of $3g(x)$ when $x = 0$

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 & 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 infection point(s) and explain why.

Q5 (3 & 2 = 5 marks) (3.1.12)
The displacement of a body from the origin O, at time t seconds, is x metres where

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

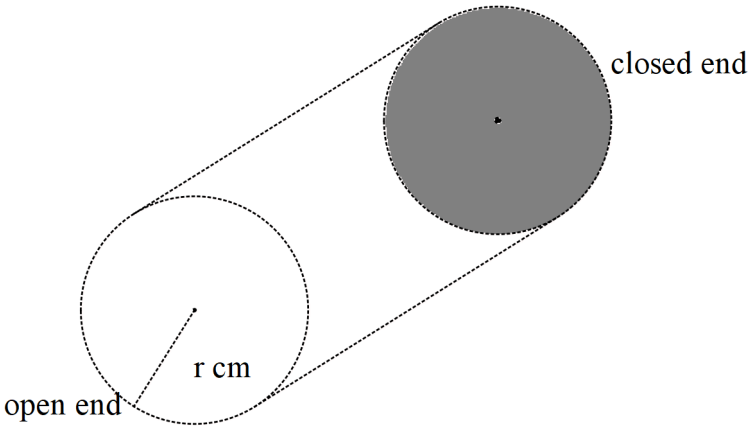
a) Determine the time(s) that the velocity is zero metres/second.

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%

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



Total surface area $50cm^2$