



Course _____ Methods Test 2 Year 12 _____

Student name: _____ Teacher name: _____
Date: 30 March

Task type: Response

Time allowed for this task: 45 mins

Number of questions: 8

Materials required: Calculator with CAS capability (to be provided by the student)

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: 46 marks

Task weighting: 10 %

Formula sheet provided: Yes

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

(3 & 3 = 6 marks)

Q1 (3.2.1-3.2.3) Determine y' in terms of x for the following.
a) $\frac{dy}{dx} = 5x^3 - \frac{x}{2}$ given that $y = 10$ when $x = 2$.

b) $\frac{dy}{dx} = \frac{(5 - x^3)^5}{50x^2}$ given that $y = 100$ when $x = 2$.

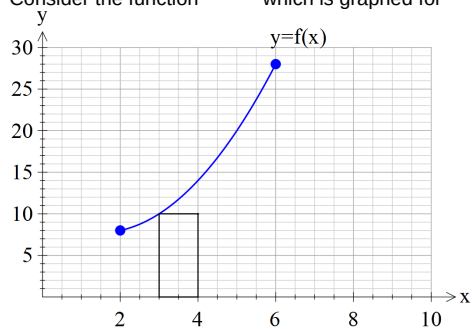
Q2 (3.2.21-3.2.22) A particle travels along a straight line such that its acceleration at time t seconds is equal to $(5t - 1)m/s^2$. When $t = 1$ the displacement is 22 metres and when $t = 3$ the displacement is -10 metres. Determine the displacement when $t = 6$.

Q3 (3.2.10-3.2.11)

(2, 2, 1 & 2 = 7 marks)

Working out space

Consider the function $f(x)$ which is graphed for $2 \leq x \leq 6$.



a) By using rectangles of width one unit, as shown above, determine a lower estimate for the area under $f(x)$ for $2 \leq x \leq 6$.

b) By using rectangles of width one unit, as shown above, determine an upper estimate for the area under $f(x)$ for $2 \leq x \leq 6$.

c) Determine a better approximation for the area under $f(x)$ for $2 \leq x \leq 6$.

d) Describe two different methods to improve the approximation for the area under $f(x)$ for $2 \leq x \leq 6$.

Working out space

Q4

(3.2.18-3.2.17)

(3 & 2 = 5 marks)

An oil tank is drained of oil such that if V KL of oil in the tank t seconds after draining commences is described by

$$\frac{dV}{dt} = 230 - \frac{120}{(t + 3)^4}.$$

The initially full tank is emptied in 2 mins.

a) How much oil was in the full tank? (nearest KL)

b) How much oil was drained from the tank in the fifth second, nearest KL .

Q5

(3.2.11-3.2.14)

(2, 2 & 2 = 6 marks)

Consider a function $f(x)$ which is only defined for $-5 \leq x \leq 7$ with

$$f(-4) = 8$$
$$f(-1) = 11$$
$$\int_0^5 f(x) dx = 22$$
$$\int_7^5 f(x) dx = -43$$

It is known that $f(x) \geq 0$ for $-5 \leq x \leq 0$ and $f(x) \leq 0$ for $0 < x \leq 7$. Determine.

a) $\int_1^4 f'(x) dx$

b) $\int_7^6 f(x) dx$

c) The area between $y = f(x)$ and the x axes for $-5 \leq x \leq 7$.

Q6 (3.2.20)

(4 marks)

Determine to two decimal places the area between the curves $y = x^3 + x + 1$ and $y = 4x$.
(Hint- Sketch the curves first on your classpad)

Q7 (3.2.16)

(2 & 2 = 4 marks)

Consider $y = \int_0^x t^3 + 3(1 + 4e^{2t})^5 dt$

Determine.

a) $\frac{dy}{dx}$

b) $\frac{d^2 y}{dx^2}$

Q8 (3.1.4)

(4 marks)

The instantaneous rate of decline in the number of kangaroos on a particular park is 30% of the population per year. If there were 12 050 kangaroos on the park 3 years ago, how many will be on the park in four years from now

Q9 (3.2.6)

(2 & 4 = 6 marks)

(a) Determine $\frac{d}{dx} \left(x(x+1)^{\frac{1}{3}} \right)$.

(b) Using your result from part (a) and **without using your classpad** determine $\int \frac{x}{3(x+1)^{\frac{2}{3}}} dx$.