Course ___Methods_Test 3_ Year __12_____

Student name: _____   Teacher name: _____

Date: **Monday 3 August**

Task type: **Response**

Time allowed for this task: _____45_____ mins

Number of questions: _____9_____

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.

Q1 (3.1.6)   (3 & 3 = 6 marks)
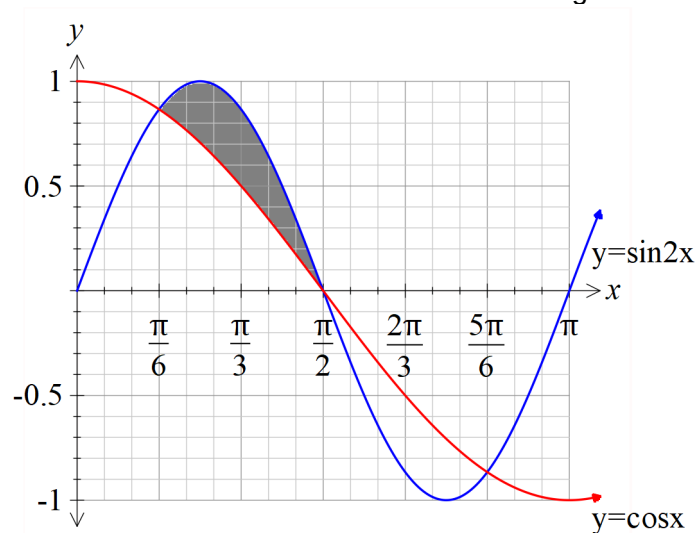Determine the exact gradient of each of the following at the given point. Show all working.

a) $y = \cos 3x$ at the point $\left(\dfrac{\pi}{3}, -1 \right)$

b) $y = 5\cos^2 x$ at the point $\left(\dfrac{\pi}{6}, \dfrac{15}{4} \right)$

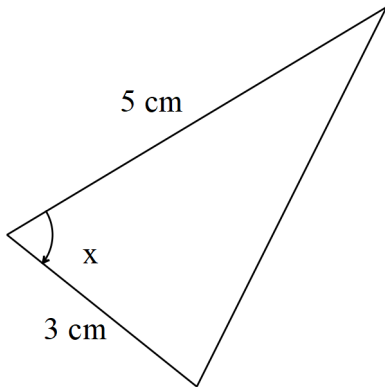Q2 (3.1.6)   (4 marks)
Determine the exact area shaded in the diagram below **without the use of a classpad**.

Q3 (3.1.6/3.1.10)   (3 & 3 = 6 marks)

Consider the triangle drawn below with angle x radians and fixed length sides 5 & 3 cm. Let A represent the area of the triangle in cm^2.

5 cm

x

3 cm

a) Determine $\dfrac{dA}{dx}$ when $x = \dfrac{\pi}{4}$.

b) Using the increments formula, determine the approximate change in the area when the angle changes from $\dfrac{\pi}{4}$ to $\dfrac{\pi}{4} + 0.01$ radians.

Q4 (3.3.1)   (4 marks)

The expected value of the discrete probability distribution, X given below, is $3\dfrac{2}{3}$. Determine the values of the constants $p \& q$ and the variance of X to 3 decimal places.

x	1	2	3	4	5
$P(X = x)$	0.1	P	0.1	q	0.3

Q5 (3.3.13)   (3 marks)
A binomial distribution has a mean of 6 and a standard deviation pf 1.9. Determine the values of $n \& p$, the number of trials and the probability of a success.

Q6 (3.3.7)   (4 marks)
A teacher needs to scale the results of her class by first multiplying be a constant and then adding a second constant. The original mean was 72 with a standard deviation of 21, the teacher needs the scaled results to have a mean of 60 and a standard deviation of 15. Determine the values of $a \& b$.

Q7 (4.1.11)   (3 & 3 = 6 marks)

The displacement of a car moving in straight line is given by $s(t)$ km at t hours, where $s(t) = 55 + t\ln(31t^2)$.

The following questions require full working and answers only given by the classpad will not receive full marks.
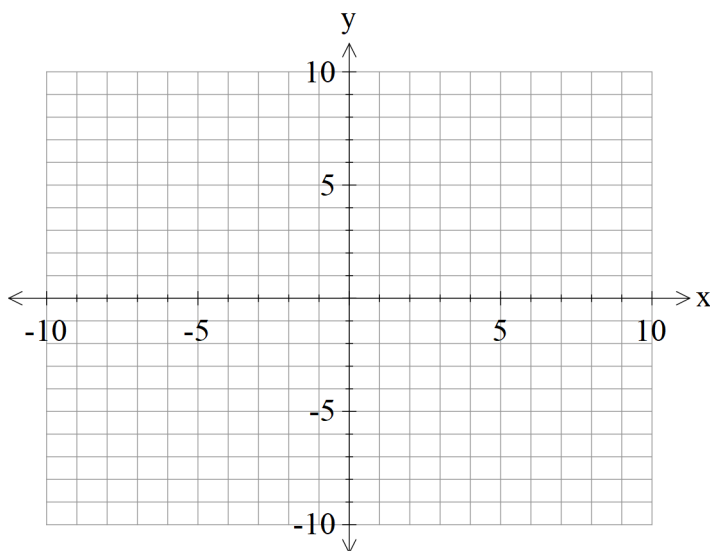
    a) Determine the velocity at $t = 3.5$ hours.

    b) Determine the time that the acceleration will be 0.2 km/h^2.

Q8 (4.1.6)   (3 & 3 = 6 marks)

Consider the function $f(x) = \ln(x-2) + 3$.

    a) Sketch the function on the axes below showing all major features.

    b) In terms of the constants $p \& q$, determine the x intercept of the function $f(x + 2p) - q$.

Q9 (4.1.11/3.2.16)   (3 & 4 = 7 marks)
This question must be answered without **the use of a classpad** to receive full marks.

a) $\dfrac{d}{dx}\big[(x+1)\ln(1+x)\big]$ (Simplify)

b) Use the result from (a) above to determine $\displaystyle\int_{2}^{3}\ln(1+x)\,dx$ in exact simplified form.