2023 Year 12 Methods Unit 3&4

Semester One Exam – Calculator Free Marker's Report.

Question 1

(a) This question was mixed in results. Those that performed well were able to calculate the areas of the defined rectangles properly but lacked in their explanation (must mention that the "area" lies between two values not just "it" lies between two values. Many students, however, made their own rectangles and obtained different total areas to those prescribed in the question. Read carefully!!

(b) Exact area was calculated well. Easy polynomial to integrate, a few arithmetic errors made especially to do with fractions – stop trying to work this all out in their heads.

Question 2

(a) This question was not answered very well. Will need to revisit this notation for a Probability Density Function. Those that recognised the probability density function as simply plugging in the x=0 and x=1 were able to obtain a quadratic to solve and obtained two values. Many students then went on to cancel k=$-\frac{1}{5}$ stating that you cannot have a negative probability. k is not a probability. k needed to be tested in each of the probabilities to see which gave the negative value.

(b) Follow through marks were a little difficult to award here as using k= $\frac{1}{3}$ actually resulted in a probability greater than 1 and many students did not see this as a concern.

(c) Those students that were able to note that this was change of scale question were able to obtain a new mean and variance based on their old mean and variance.

Question 3

(a) This question tricked many students by asking for the rate of change of a derivative. Many students simply substituted x=3 into original f'(x). Read carefully.

(b) Integration was performed quite well in this question and most students remembered to obtain a value for 'c'. Was a good question to mark.

(c) Many students did not notice the boundaries were reversed and therefore did not make t the upper boundary and use the negative. FTOC was used well.

Question 4

(a) Product rule was used very well for the first part of this question and then $5e^{5x}$ was factorised out well. There were a number of students who struggled to then solve this equation = to zero. Many students jumped straight to $\frac{\pi}{4}$ and ignored the fact that it was 5x being solved not just x.

(b) This question was completed better as second derivative was easy enough to determine and substituting in 4π made the expression easier to simplify. Some students are mixing up concave up and concave down and need to review the definitions of some terms.

Question 5

(a) This was excellently answered. Use of quotient rule was easy enough and not much simplifying was necessary at all to gain the 2 marks

(b) Probably the worst attempted question of Section One.

A large amount of students tried to use the expression from part a) in this question. It had nothing to do with the question. Many students did not remember that when differentiating trig functions we are working in radians NOT degrees so ignored the piece of information that $1° \approx 0.017$ radians.

Those that were able to determine the change in y then forgot to add this to the original value of cos(150) to determine the value of cos(151) – did not read the question properly.

A lot of concerns highlighted here – I see a need to revisit incremental change and more work on extracting correct information from a question.

Question 6

This question was surprisingly completed quite poorly – I believe this is because a simple diagram was not drawn.

(a) Drawing a simple rectangle here and labelling it BCDE (exactly as the question states) would have simplified the question. It was then a simple case of recognising length x width (the width which needed to be determined by using Pythagoras,

Also $(8 - x)^2$ does NOT = $64 - x^2$.

(b) This part was much better as students were able to use the equation from part a) to maximise area. Derivative was completed well and equating to zero also completed well.

Question 7

(a) A very mixed bag of results for this question.

Students either obtained full marks by recognising simple areas between boundaries (this was the easiest way to approach the question), or obtained no marks simply from not understanding the notation being used (because they did not substitute the t values into the expression.
A third group of students I think ran out of time so were not able to tackle this question appropriately.

(b) Both methods were used here – plotting points or integrating the linear to obtain equation of quadratic – or, again, a number of students did not have time to reach this question.

Overall Average (Calculator Free) – 62.74%