Candidates' performance

Module 1

Section A

Question Number	Performance in General
1. (a) (b) (c)	Excellent. A few candidates neglected the requirement 'in descending powers of u' when expanding $\left(u+\frac{1}{u}\right)^4$. Satisfactory. Some candidates repeated steps in (a) because they did not make use of the fact that $e^{-ax}=\frac{1}{e^{ax}}$. Some candidates were not able to use power series of an exponential function, while some others expressed $(e^{ax}+e^{-ax})^4$ in powers of e^{2ax}. Poor. Many candidates were not able to get the correct answer of (b), hence failed to get the answer for this part.
2.	Satisfactory. Some candidates found $\frac{dp}{dt}$ or $\frac{dC}{dp}$ wrongly (for example, writing $\frac{dC}{dp}=2^p\ln p$ or $p2^{p-1}$), while some others obtained $\frac{dC}{dt}$ correctly but did not substitute 5 for t.
3. (a) (b) (c)	Good. Some candidates found the equation of the tangent to C at $x=3$ instead of the equation of L. Good. Some candidates did not know how to solve equations with fraction exponents or missed out the root $x=0$ by dividing both sides of an equation by x. Fair. Most candidates made mistakes in finding correct primitive functions or calculating the final answer.
4. (a) (i) (ii) (b) (i) (ii)	Excellent. Very good. A few candidates found $\frac{dy}{du}$ or $\ln y$ which was not required. Satisfactory. Many candidates used values of $\ln u$ with only one decimal place to plot graphs, which made it difficult to determine which value of y should be incorrect. Some others made mistakes in plotting the graph although using more accurate values of $\ln u$. Fair. Some candidates used correct algebraic method but with values of $\ln u$ not accurate enough. Some others used graphs plotted in (i), but were not able to get the value of the ($\ln u$)-intercept of the straight line accurate enough.
5. (a) (b)	Excellent. Satisfactory. Some candidates failed to use the result of (a), while some others wrote $x\ln x$ instead of $[x\ln x]_1^e$.
6.	Good. Some candidates treated 75 as the sample size. Some wrote wrong expressions for the approximate standard deviation of the sample proportion.
7. (a) (b) (i) (ii)	Excellent. Good. Mistakes were occasionally found in computations. Fair. A lot of candidates thought that the independence of two events A and B could be verified by checking $P(A\cap B)=0$. Among those who found correct values of related probabilities, some did not mention $P(A\cap B)\neq P(A)\cdot P(B)$ as the reason to make conclusion, while some made a wrong conclusion that 'A and B are independent'.

8. (a) (b) (c)	Fair. Many candidates actually found P(Mabel is selected and Team A gets a prize) instead of the required probability. Good. Satisfactory. Quite a number of candidates were weak in applying Bayes' theorem.
9. (a) (b) (c)	Very good. Some candidates showed poor presentation such as '$P\left(Z<\frac{39000-\mu}{5000}\right)=0.9641$', '$P\left(\frac{39000-\mu}{5000}\right)=0.9641$', '$P\left(Z<\frac{39000-\mu}{5000}\right)=0.4641=0.9641$' or '$0.9641=0.18$'. Good. Some candidates used '$0.4452+0.1554$' to find the probability required. Fair. Some candidates used same symbols for both random variables before and after standardization. Many did not show enough ability to solve inequalities, such as writing a negative number greater than or equal to a positive number.
10. (a) (i) (ii) (1) (2) (b) (i) (ii)	Satisfactory. Some candidates were not able to solve the inequality $\ln(x^2+16)-\ln(3x+20)<0$. Some considered $[\ln(x^2+16)-\ln(3x+20)]'<0$ instead. Satisfactory. Some candidates did not apply the formula for trapezoidal rule correctly. Some found the absolute value of I instead. Satisfactory. After obtaining $f'(x)$, many candidates got a point $x_0\in[0,4]$ such that $f(x)$ would decrease on $[0,x_0)$ and increase on $(x_0,4]$, and then claimed immediately that the estimate in (1) was an over-estimate. Among those who were able to find $f''(x)$, only few showed that $f''(x)>0$ for all $x\in[0,4]$ correctly. Poor. A common mistake was to write $N(t)=10\ln(t^2+16)-10\ln(3t+20)$ and then to differentiate both sides of it. Very poor. Common mistakes included writing $N(t)=\int_0^4[10\ln(t^2+16)-10\ln(3t+20)]\,dt$ and failing to apply the result of (a)(ii)(2) in additional to that of (a)(ii)(1).
11. (a) (b) (c) (d)	Fair. Some candidates confused $R(t)$ with $R'(t)$, or found $R(t)=P(t)-C(t)$ by integration first and then obtained the expression for $R'(t)=P'(t)-C'(t)$ by differentiation. Many candidates failed to make use of knowledge about quadratic equations to solve for t. Some got wrong answers such as '$e^{\frac{-t}{5}}=0.25$ or 2' or did not reject $t=-10\ln 2$. Very poor. Many candidates failed to find $R''(t)$ correctly. Among those who were able to find $R''(t)$, only few provided sufficient reasons to conclude that '$R'(t)$ decreases with t'. Very poor. Common mistakes included putting wrong values as limits of the definite integral involved and getting wrong primitives of its integrand. Poor. Few candidates were able to use correctly the method of substitution for integration. Among them, some put wrong values as limits of definite integrals, while some others missed out the term $\int_5^8 9\,dt$ or wrote $\int_{\ln 38}^{\ln 83} 9\,dt$.
12. (a) (b) (c) (i) (ii)	Good. Some wrote $\frac{\sigma}{49}$ or $\frac{\sigma^2}{\sqrt{49}}$ instead of $\frac{\sigma}{\sqrt{49}}$ as the standard deviation of the sample mean. Poor. Many candidates tried to use the standard deviation of the combined sample instead of that of the population. Some thought that the mean of the combined sample would be $\frac{4.82+4.9}{2}$. Fair. Some candidates assigned wrong values to μ and σ. Poor. Some candidates missed out the factor C_1^2 in calculating the probability required.

13.	(a)	Good. Some candidates missed out the term $e^{-1.9}\frac{1.9^2}{2!}$ in the expression $1-e^{-1.9}\left(1+\frac{1.9^1}{1!}+\frac{1.9^2}{2!}\right)$, while some others missed out the factor $e^{-1.9}$.
	(b)	Satisfactory. Mistakes found were missing the factor C_2^5 or replacing it by C_3^6.
	(c)	Poor. Some candidates missed out the factor 15 or 12, while some others used 1.9, the mean of the Poisson distribution given, instead of the probability found in (a).
	(d)	Poor. Most candidates were not able to analyse the events correctly to calculate the probabilities.
	(i)	Some candidates multiplied factors such as C_3^4, 15 or $\frac{1}{15}$ to the probability $(1-0.296279646)\cdot 0.296279646^3$, some multiplied 2 to 0.296279646^3, while some others wrote $2(1-0.296279646)\cdot 0.296279646^3$ without adding 0.296279646^4 to it.
	(ii)	Some candidates used the probability found in (a) instead of that in (d)(i).

General comments and recommendations

1. Candidates should write 'ln' rather than 'In' for natural logarithm.

2. Some candidates confused sample mean (or standard deviation) with population mean (or standard deviation).

3. Candidates are advised to be more careful in doing computations in order to avoid careless mistakes.

4. Candidates should pay more attention to the accuracy required for a final answer and keep enough accuracy of intermediate results for this purpose.