Candidates' Performance

Module 1 (Calculus and Statistics)

Candidates generally performed better in Section A than in Section B.

Section A

Question Number	Performance in General
1	Very good. Over 80% of the candidates were able to obtain the required values by using the formula $\operatorname{Var}(X) = E(X^2) - (E(X))^2$, and the properties $E(3X+5) = 3E(X)+5$ and $\operatorname{Var}(3X+5) = 9\operatorname{Var}(X)$.
2 (a)	Very good. Most candidates were able to write $P(A' \cap B') = P(B' \mid A')P(A')$ correctly, but a small number of candidates were unable to use $P(A') = P(A' \cap B') + P(A' \cap B)$ to set an equation in $P(A)$ or $P(A')$.
(b)	Good. Many candidates were able to use $P(A)P(B) = P(A \cap B)$ to find $P(B)$.
3 (a)	Very good. Most candidates were able to obtain the required mean, but a small number of candidates were unable to find the required variance.
(b)	Very good. Over 75% of the candidates were able to obtain the probabilities of winning the big prize and not winning the big prize within the first 4 draws, and drew a correct conclusion.
(c)	Very good. Over 80% of the candidates were able to obtain the required probability by using the result of (b).
4 (a)	Very good. Over 90% of the candidates were able to obtain the required probability by using the concept of tree diagram.
(b)	Very good. Over 85% of the candidates were able to obtain the conditional probability by using the result of (a).
(c)	Very good. Over 80% of the candidates were able to consider the complementary event to obtain the required probability.
5 (a)	Good. Some candidates were unable to show that $f'(x) < 0$ to complete the proof.
(b)	Good. Some candidates were unable to consider $\lim_{x \to \infty} f(x) = \lim_{x \to \infty} \frac{\frac{6}{x} - 1}{1 + \frac{3}{x}}$ to obtain the required limit.
(c)	Good. Many candidates were able to use integration to obtain the required area, but some candidates were unable to give the answer in exact value.
6 (a)	Very good. About 90% of the candidates were able to expand e^{-18x} , but a small number of candidates were unable to show all working.
(b)	Very good. Most candidates were able to expand $(1+4x)^n$, but a small number of candidates were unable to express C_2^n in terms of n .

Question Number	Performance in General
7 (a)	Good. Many candidates were able to find $\frac{dy}{dx}$ by using the chain rule.
(b)	Fair. Some candidates were able to solve the equation $\frac{9x+6}{2\sqrt{3x+6}}-8=0$ by removing the radical. However, many candidates mistakenly thought that $x=\frac{-50}{27}$ was also a root of the equation.
8 (a)	Good. Many candidates were able to obtain the required answer by taking logarithms.
(b)	Good. Many candidates were able to obtain the required indefinite integral by considering $\frac{d}{dx}(x7^{-x})$.
(c)	Fair. Some candidates were able to obtain the required definite integral by using the result of (b).

Section B

Question Number	Performance in General
9 (a)	Very good. About 85% of the candidates were able to write down all the six Poisson probabilities.
(b)	Very good. About 90% of the candidates were able to obtain the required probability by standardization.
(c) (i)	Good. Many candidates were able to obtain the required probability by using the answer of (b) and the correct Poisson probability.
(ii)	Good. Some candidates wrongly multiplied an unnecessary Poisson probability to the required probability, while some candidates missed the binomial coefficients in finding the probability.
(iii)	Good. However, some candidates were unable to find the probability that the team wins exactly 5 matches in a certain season and is awarded a bonus in that season. As a result, they were unable to find the required conditional probability.
10 (a) (i)	Very good. Over 75% of the candidates were able to use the correct formula to find the confidence interval.
(ii)	Very good. A small number of candidates wrongly used the sample mean in (a)(i) to find the least sample size.
(b) (i)	Good. Many candidates were able to obtain the required answer by standardization, but some candidates were unable to give the answer in percentage as required.
(ii)	Good. Many candidates were able to obtain the required conditional probability by using the result of (b)(i) .

Question Number	Performance in General
11 (a) (i)	Very good. Most candidates were able to use correct sub-intervals when applying the trapezoidal rule to find α_1 .
(ii)	Good. Many candidates were able to consider the second derivative $\frac{d^2p(t)}{dt^2}$ to determine the nature of the estimate α_1. However, some candidates were unable to show clearly that $\frac{d^2p(t)}{dt^2}=0$ when $t=0$ and $\frac{d^2p(t)}{dt^2}>0$ for $0<t\le 4$, thus were unable to draw the correct conclusion that α_1 is an over-estimate.
(b) (i)	Good. Many candidates were able to use integration by substitution to find β .
(ii)	Poor. Most candidates were unable to use an appropriate compound inequality such as $\frac{\beta}{\alpha+\beta}>\frac{\beta}{\alpha_1+\beta}>30\%$ to complete the argument.
12 (a)	Very good. About 90% of the candidates were able to express $\ln\left(\frac{64}{V}-4\right)$ as a linear function of t .
(b) (i)	Very good. Over 80% of the candidates were able to find h and k .
(ii)	Very good. Most candidates were able to find $\frac{dV}{dt}$ by using the chain rule.
(iii)	Fair. Many candidates were unable to test whether $\frac{dV}{dt}$ attains its least value when $\frac{d}{dt}\left(\frac{dV}{dt}\right)=0$.
(c) (i)	Fair. Some candidates were able to obtain the required value of $\frac{dS}{dt}$ by writing $\frac{dS}{dt}=\frac{2}{3}V^{\frac{-1}{3}}\frac{dV}{dt}$.
(ii)	Poor. Most candidates were unable to find the correct expression of $\frac{d}{dt}\left(\frac{dS}{dt}\right)$, and hence were unable to draw a correct conclusion.

General recommendations

Candidates are advised to:

1. have more practice in counting involving combinations;
2. have more practice in solving equations involving radicals;
3. have more practice in finding $\frac{d}{dt}a^{bt}$, where a and b are constants;
4. have more practice in finding $\int a^{bx}dx$, where a and b are constants; and
5. pay attention to the accuracy required for the final answer and keep enough accuracy of intermediate results for this purpose.