Candidates' Performance

Module 1 (Calculus and Statistics)

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

Question 4

Question Number	Performance in General
1 (a)	Very good. Over 80% of the candidates were able to find $P(B)$ by using $P(B)=P(B\mid A)P(A)+P(B\mid A')P(A')$.
(b)	Very good. About 80% of the candidates were able to find the value of $P(A\mid B)$ by using Bayes' Theorem.
(c)	Very good. Most candidates were able to find the value of $P(A\cup B)$.
2 (a) (i)	Good. Many candidates were able to find the required sample proportion of households.
(ii)	Good. Many candidates were able to find the value of β but some candidates wrongly thought that $\beta=97\%$.
(b)	Fair. Many candidates were unable to set up the correct inequality $1-(1-0.2)^n>0.999$.
3 (a)	Very good. About 90% of the candidates were able to perform standardization and find the required probability.
(b) (i)	Very good. About 75% of the candidates were able to find the value of $P(X\le 3)$.
(ii)	Good. Many candidates were able to write down $E(X)=\frac{1}{p}$, where p is the probability of getting an *oversized* marble, but some candidates wrongly thought that $E(X)=\frac{1}{p}-1$.
4 (a)	Very good. About 80% of the candidates were able to complete the proof by expressing $Var(Y)$ correctly in form of either $E(Y^2)-[E(Y)]^2$ or $E([Y-E(Y)]^2)$.
(b)	Very good. About 70% of the candidates were able to find the value of m by using $8E(2Y-1)=16E(Y)-8$ and $Var(2Y-1)=4Var(Y)$.
5 (a)	Very good. Over 85% of the candidates were able to find the value of α.
(b) (i)	Good. Many candidates were able to find $f(x)$ by indefinite integral but some candidates were unable to use a suitable substitution.
(ii)	Fair. Only some candidates were able to find the constant of integration in (b)(i), and thus the required limit.
6 (a)	Very good. Over 80% of the candidates were able to expand $e^{kx}+e^{2x}$.
(b)	Very good. Most candidates were able to find the value of k by writing down the coefficients of x and x^2 correctly.

Question Number	Performance in General
7 (a)	Good. Many candidates were able to find $\frac{dy}{dx}$ but some candidates did not explain clearly why $h = 4.0625$ is not a possible answer.
(b)	Good. Many candidates were able to find the maximum value of y and the corresponding value of x, but some candidates were unable to write down the coordinates of the maximum point.
(c)	Good. Many candidates were able to write down the equation of horizontal tangent by using the result of (b).
8 (a)	Very good. Most candidates were able to use the result of $\frac{d}{dx}(x \ln x)$ to find $\int \ln x \, dx$.
(b)	Good. Many candidates were able to find $\int \frac{\ln x}{x} dx$ by using integration by substitution.
(c)	Good. Many candidates were able to use the results of (a) and (b) to find $\int \frac{(x-1)(\ln x - 1)}{x} dx$ but some candidates were unable to find the correct upper and lower limits of the required definite integral.

Section B

Question Number	Performance in General
9 (a)	Very good. Many candidates were able to find μ and a by standardizing the normal variable correctly.
(b)	Very good. About 75% of the candidates were able to find the required probability.
(c) (i)	Fair. Many candidates missed the binomial coefficients in finding the probability.
(ii)	Fair. Some candidates were able to use the results of (b) and (c)(i) to find the required conditional probability.
(iii)	Fair. Many candidates were unable to count correctly the number of cases under the given condition, hence they were unable to find the required conditional probability.
10 (a)	Very good. Over 85% of the candidates were able to write down the two Poisson probabilities.
(b)	Good. In finding the expected bonus, many candidates were able to use Poisson distribution with 7.2 in Suggestion II, but some candidates missed the binomial coefficients in Suggestion I.
(c) (i)	Good. Many candidates were able to express the answer in terms of e and λ.
(ii)	Good. Many candidates were able to use conditional probability to find the value of λ.
11 (a) (i)	Very good. Most candidates were able to use correct sub-intervals when applying the trapezoidal rule to find D_1.
(ii)	Good. Many candidates were able to consider the second derivative $\frac{d^2A}{dt^2}$ to determine whether D_1 is an over-estimate or an under-estimate.
(b) (i)	Good. Many candidates were able to use integration by substitution to find D_2.
(ii)	Poor. Most candidates were unable to use a compound inequality such as $D_2 < D_1 < D$ to finish the argument.
12 (a)	Very good. About 85% of the candidates were able to find r and s.
(b) (i)	Fair. Many candidates were unable to write $e^{\ln 3^{-0.2t}}$ as $3^{-0.2t}$ to complete the proof.
(ii)	Good. Many candidates were able to draw a conclusion by solving the equation $4 = \frac{40}{3^{1-0.2t}+1}$.
(iii)	Fair. Many candidates were unable to find $\frac{d}{dt}3^{1-0.2t}$, hence they were unable to find $\frac{dN}{dt}$ and $\frac{d^2N}{dt^2}$ correctly.
(iv)	Poor. Only a small number of candidates were able to describe correctly how $\frac{dN}{dt}$ varies.

General recommendations

Candidates are advised to:

1. have a better understanding of the properties of natural logarithms;
2. have more practice in counting involving combinations;
3. have more practice in solving equations involving radicals;
4. have more practice in finding $\frac{\mathrm{d}}{\mathrm{d}t}a^{bt}$, 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.