Candidates' Performance

Module 2 (Algebra and Calculus)

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

Section A

Question Number	Performance in General
1	Good. Some candidates were unable to write $f'(1)$ as $\lim_{h\to 0}\frac{f(1+h)-f(1)}{h}$, hence they were unable to find the derivative from first principles.
2	Very good. Over 60% of the candidates were able to expand $(x+3)^5$ and $\left(x-\frac{4}{x}\right)^2$, hence they were able to find the required coefficient of x^3.
3 (a)	Very good. About 65% of the candidates were able to complete the proof by using the sum to product formulas.
(b)	Good. Many candidates were able to solve the equation by using the result of (a).
4 (a)	Good. Some candidates were unable to find the indefinite integral $\int 5^x dx$, hence they were unable to find the required integral.
(b)	Fair. Many candidates were unable to find $\int_0^1 x(5^{2x})dx$. Only some candidates were able to find the required area by using the result of (a).
5 (a)	Very good. Most candidates were able to find the indefinite integral by using a suitable substitution.
(b)	Good. Many candidates were able to find the equation of Γ by using the result of (a).
6 (a)	Very good. About 65% of the candidates were able to complete the proof by using mathematical induction.
(b)	Very good. Most candidates were familiar with the summation notation, hence they were able to find the required sum.
7 (a)	Very good. Over 80% of the candidates were familiar with the matrix operations, hence they were able to express b and c in terms of a.
(b)	Good. Many candidates were able to consider the determinant of X but some candidates were unable to state that the determinant is not equal to zero.
(c)	Good. Many candidates were able to express $(X^T)^{-1}$ in terms of a.
8 (a)	Good. Many candidates were able to find $f'(x)$ by chain rule or quotient rule.
(b)	Fair. Some candidates were unable to state that $y=0$ is the only asymptote of the graph.
(c)	Fair. Many candidates were unable to find $f''(x)$ correctly, hence they were unable to find the points of inflexion.

Section B

Question Number	Performance in General
9 (a)	Good. Many candidates were able to find $\frac{dy}{dx}$ to complete the proof.
(b)	Fair. Many candidates were unable to express the area of ΔPQR in terms of r correctly.
(c)	Poor. Only a small number of candidates were able to express OP in terms of r. Hence, they were able to express $\frac{dOP}{dt}$ in terms of $\frac{dr}{dt}$ and r. In fact, most candidates were unable to express $\frac{dA}{dt}$ in terms of $\frac{dOP}{dt}$ and r, where A is the area of ΔPQR.
10 (a) (i)	Fair. Some candidates were able to complete the proof by using integration by parts.
(ii)	Good. Many candidates were able to find the definite integral by using the result of (a)(i).
(b) (i)	Good. Many candidates were able to complete the proof by using integration by substitution.
(ii)	Good. Many candidates were able to find the definite integral by using the results of (a)(ii) and (b)(i).
(c)	Fair. Many candidates were able to write down the definite integral for the required volume. However, only some of them were able to find the required volume by using a suitable substitution.
11 (a) (i) (1)	Very good. Most candidates were able to find the range of values of a by using the condition $\Delta \neq 0$.
(2)	Fair. Many candidates were unable to express the unique solution of the system of the linear equations in terms of a and b correctly by using Cramer's rule or Gaussian elimination.
(ii)	Good. Many candidates were able to find the value of b by using Gaussian elimination and they were also able to solve (E).
(b)	Good. Many candidates were able to observe the relationship between (E) and (F), hence they were able to use the results of (a)(ii) to find the values of s and t correctly.
12 (a)	Fair. Some candidates were able to find the required cross product and they were also able to point out that the volume of the tetrahedron $ABCD$ is equal to $\frac{1}{6}\left\lvert(\overrightarrow{AB}\times\overrightarrow{AC})\cdot\overrightarrow{AD}\right\rvert$. Only some candidates were able to find $\overrightarrow{DE}$ by using the result of (a)(i).
(b) (i)	Poor. Most candidates were unable to express $\overrightarrow{DF}$ in terms of $\overrightarrow{DB}$ and $\overrightarrow{DC}$, hence they were unable to find $\overrightarrow{DF}$ correctly.
(ii)	Poor. Most candidates were unable to find $\overrightarrow{EF}$ correctly. Only a small number of candidates were able to prove that $\overrightarrow{BC}$ is perpendicular to $\overrightarrow{EF}$.
(c)	Poor. Most candidates were unable to point out that the required angle is $\angle DFE$.