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	Very good. Most candidates were able to apply binominal theorem to expand $(5+x)^4$ and only a few candidates were unable to find the constant term.
2	Very good. Most candidates were able to complete the proof by multiplying $\sqrt{x+h}+\sqrt{x}$ to both numerator and denominator and they were able to find the derivative from first principles.
3 (a)	Very good. About 75% of the candidates were able to express the area of ΔOPQ in terms of u .
(b)	Good. Some candidates were unfamiliar with rates of change and hence they were unable to find the rate of change of the area of ΔOPQ when $u=4$. Some candidates wrongly thought that $\frac{du}{dt}=6$.
4 (a)	Very good. Most candidates were able to write down the vertical asymptote of the graph of $y=f(x)$ and they were able to obtain the oblique asymptote by writing $f(x)$ as $2x+3+\frac{4}{x-1}$.
(b)	Very good. Most candidates were able to apply quotient rule to find $f'(x)$ and hence they were able to find the slope of the normal to G at the point $(2,11)$.
5 (a)	Very good. Most candidates were able to complete the proof by using mathematical induction.
(b)	Good. Many candidates were able to use (a) to evaluate $\sum_{k=3}^{333}(-1)^{k+1}k^2$.
6 (a)	Very good. About 98% of candidates were able to use the factor theorem to complete the proof.
(b)	Very good. Most candidates were able to use trigonometric formulas to express $\cos 3\theta$ in terms of $\cos\theta$.
(c)	Poor. Most candidates were unable to prove that $\cos\frac{3\pi}{5}$ or $\cos\frac{\pi}{5}$ is a root of the equation $4x^3+2x^2-3x-1=0$. Hence, most candidates were unable to use the results of (a) and (b) to complete the proof.

Question Number	Performance in General
7 (a)	Very good. Most candidates were able to use a suitable substitution to find $\int(1+\sqrt{t+1})^2\,dt$.
(b)	Fair. Many candidates were unable to express x in terms of y and some candidates were unable to find the lower limit and upper limit of the definite integral. Thus, many candidates were unable to find the volume of the solid of revolution generated by revolving R about the y-axis.
8 (a) (i)	Very good. Over 90% of the candidates were able to find the matrix A^2 .
(ii)	Very good. Most candidates were able to find the marix A^n but a few candidates skipped the step of finding A^3 .
(iii)	Good. Many candidates were able to find the inverse matrix of A^n but some candidates did not prove that $\det(A^n)=1$.
(b) (i)	Fair. Only some candidates were able to evaluate $\sum_{k=0}^{n-1}2^k$.
(ii)	Fair. Only some candidates were able to find the answer. Many candidates were unable to show the steps clearly.

Section B

Question Number	Performance in General
9 (a)	Very good. Over 70% of the candidates were able to set up two equations to find the values of a and b but a few candidates wrongly thought that $f''(-1)=0$ instead of $f'(-1)=0$.
(b)	Good. Many candidates were able to use the second derivative test to complete the proof. However, some candidates stated the wrong range of values of x when using the first derivative test.
(c)	Good. Many candidates were able to find the minimum value but some candidates wrongly gave the minimum point instead of the minimum value as the answer.
(d)	Good. Many candidates were able to find the point of inflexion but some candidates did not show the checking steps.
(e)	Fair. Many candidates were unable to find the lower limit and upper limit of the definite integral, and hence they were unable to find the area of the region bounded by C and L.
10 (a)	Good. Many candidates were able to complete the proof but some candidates were unable to handle the dummy variable when using integration by substitution.
(b)	Fair. Many candidates were unable to use the result of (a) to complete the proof.
(c)	Fair. Only some candidates were able to use the result of (b) to complete the proof.
(d)	Fair. Many candidates were unable to observe that $\frac{d}{dx}\ln(1+\tan x)=\frac{\sec^2 x}{1+\tan x}$, and hence they were unable to get the correct answer by using integration by parts.
11 (a) (i) (1)	Very good. Apart from manipulation errors, most candidates were able to give the condition $\Delta \neq 0$. A few candidates wrongly gave '$a \neq -2$ or $a \neq -12$' instead of '$a \neq -2$ and $a \neq -12$' as the answer.
(2)	Fair. Only some candidates were able to use the Cramer's rule to get the answer while some other candidates made careless mistakes in evaluating the determinants.
(ii) (1)	Good. Many candidates were able to find the value of b by using Gaussian elimination.
(2)	Good. Many candidates were able to find the correct general solution by getting a correct augmented matrix.
(b)	Fair. Only some candidates were able to arrive at a correct conclusion by using the method of completing the square.

Question Number	Performance in General
12 (a)	Good. Many candidates were able to find the value of t by setting up the correct equation.
(b) (i)	Fair. Only some candidates were able to find a unit vector which is perpendicular to Π by using the cross product.
(ii)	Poor. Most candidates wrongly found the angle between $\overrightarrow{CD}$ and a unit vector which is perpendicular to Π instead of the angle between CD and Π.
(iii)	Poor. Only a few candidates were able to prove that D, E and F are collinear while over 90% of the candidates were unable to notice that $DE = DF$. Thus, they were unable to conclude that D is the mid-point of the line segment joining E and F.

General recommendations

Candidates are advised to:

1. show all working;
2. have more practice in solving problems involving rate of change;
3. have more practice on integration;
4. write in appropriate vector notation such as the vector sign, scalar and vector multiplication signs; and
5. check whether all conditions have been fulfilled before using proved results.