

UNIVERSITY OF MALTA

**THE MATRICULATION CERTIFICATE EXAMINATION
INTERMEDIATE LEVEL**

**PURE MATHEMATICS
May 2012**

EXAMINERS' REPORT

**MATRICULATION AND SECONDARY EDUCATION
CERTIFICATE EXAMINATIONS BOARD**

**Pure Mathematics
Intermediate Level
May 2012**

Part 1: Statistical Information

The distributions of grades awarded in the May 2012 session are given in the table below.

| GRADE | A | B | C | D | E | F | Abs | Total |
|------------|------|------|-------|-------|-------|-------|------|-------|
| Number | 31 | 51 | 108 | 94 | 76 | 171 | 27 | 558 |
| % of Total | 5.56 | 9.14 | 19.35 | 16.85 | 13.62 | 30.65 | 4.84 | 100 |

Part 2: Comments regarding candidate's performance

Q1: This question was generally well answered. In Parts (a) and (b), most attempts were good. However, some candidates still seem to think that $\log(4^{x+1} 3^{2x-1}) = \log 4^{x+1} \times \log 3^{2x-1}$, or that $\log(3x+1) = \log 3x + \log 1$.

Another common mistake was that

$$(x+1)(3x+1) = 65 \quad \Rightarrow \quad (x+1) = 65 \quad \text{or} \quad (3x+1) = 65.$$

Part (c) was very well attempted by the majority of candidates.

Q2: Part (i) was generally well done. Most candidates managed by division to show that $f(x) = (x-3)(x^2-2)$, but factorized (x^2-2) as $(x-2)(x+2)$.

Many candidates appeared to be confused by Part (ii). For deducing the solutions of $f(x+1) = 0$ from the solutions of $f(x) = 0$, many candidates found $f(0)$ and $f(-1)$.

In Part (iii) very few wrote down symbolically that $f(x) \rightarrow -\infty$. The vast majority tried to express the behaviour of $f(x)$ by writing expressions such as "it goes more to negative".

In part (iv) the integration was very well done.

Q3: This question was not well answered. In Part (i), various types of errors were committed in finding the minimum and maximum values of h , which could have easily been written down by substituting $\sin t = -1$ and $\sin t = 1$ respectively. Many candidates assumed that h is minimum when $t = 0$ and

maximum when $t = 2\pi$, which give the same value for h . Another common error was that $10 \cos t = 0 \Rightarrow t = \cos^{-1}\left(\frac{1}{10}\right)$.

It is also clear that most candidates did not understand the meaning of “rate of increase” in Part (v).

Q4: Part a) was worked correctly by a good number of candidates; however some candidates still failed to see that this problem was based on geometric series. Improper knowledge of indices led to incorrect results.

In Part b), instead of using arithmetic series, some candidates listed all the multiples of nine and then added them up.

Q5: In Part (i), the gradient of tangent was found correctly, and in most cases the equation of the tangent was correctly obtained.

The evaluation of the point of intersection in Part (ii) was properly evaluated once the equation of the tangent was correctly. It was obvious that most candidates knew the condition of perpendicularity of two lines.

In Part (iv), the method of completing the square was not applied correctly in some cases, although other methods were used to show that $f(x) = 0$ has no real solution.

Q6: In Part (a), some candidates did not obtain the correct binomial expansion; a considerable number of candidates failed to use the appropriate value of x to obtain the approximate estimate.

In Part (b) (i), the number of permutations was found correctly in most cases, but in (ii), the number of permutations was incorrectly calculated. Not all candidates who worked (ii) correctly, provided the correct result for part (iii).

Q7: In Part (a), the derivatives were found correctly by a good number of students.

Part (b) was solved correctly by about one third of the students, but the rest had no idea how to solve it.

Q8: This question was not very well answered. In Part (a)(i), some candidates did not find the constant of integration, thus affecting the solution in Part (a) (ii).

In Part (b), a good number of students integrated the function e^{-x} incorrectly, whilst others substituted the values 0 and 10 incorrectly. Many students failed to draw a graph of this integral, or failed to show the asymptote on it.

Q9: This question was well answered. Most candidates managed to work out the first two parts of this question correctly, and also managed to interpret the combined final transformation correctly.

Q10: Part (i) of this question was generally well answered.

In Part (ii), some students did not find the determinant, or found its reciprocal by mistake.

In Part (iii), a fair number of students divided the matrix polynomial by the matrix A , or by the Identity, which is obviously incorrect.

**Chairperson
Board of Examiners
July 2012**