



(Company No. 101067-P)

الجامعة الإسلامية العالمية ماليزيا
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA
يُونَيْبَرِيسِيَّتِي اِسْلَامِيَّةٌ اِنْتَارَايْجِسِيَا مَلِيْسِيَا

Garden of Knowledge and Virtue

IIUM Mathematics Competition (IMC 2019)

FINAL ROUND: SUBJECTIVE QUESTIONS

18th SEPTEMBER 2019

2 ½ HOURS (09:30 am – 12:00 pm)

Name : _____

I/C No. : _____

INSTRUCTIONS TO STUDENTS:

1. This paper consists of 6 printed pages (including cover page) with **5 subjective questions**.
2. Answer **ALL** questions in this booklet.
3. Students are allowed to use pencil, pen, eraser, and ruler **ONLY**.
4. Students are **NOT** allowed to bring a book, calculator, briefcase, hand phone, protractor, compass, etc.
5. Students are **NOT** allowed to discuss the questions during the examination.

Name: _____

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1. Five students have the first names Clark, Donald, Jack, Robin and Steve, and have the last names (in a different order) Clarkson, Donaldson, Jackson, Robinson and Stevenson. It is known that Clark is 1 year older than Clarkson, Donald is 2 years older than Donaldson, Jack is 3 years older than Jackson, Robin is 4 years older than Robinson.

Who is older, Steve or Stevenson? And what is the difference in their ages? **(12 Marks)**

Lima pelajar bernama Clark, Donald, Jack, Robin dan Steve mempunyai nama keluarga (dalam susunan berbeza) Clarkson, Donaldson, Jackson, Robinson dan Stevenson. Diketahui bahawa Clark adalah setahun lebih tua daripada Clarkson, Donald adalah 2 tahun lebih tua daripada Donaldson, Jack adalah 3 tahun lebih tua daripada Jackson, Robin adalah 4 tahun lebih tua daripada Robinson.

Siapakah yang lebih tua, Steve atau Stevenson? Dan berapakah beza umur diantara mereka?

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- 2 Let $C(n)$ be the number of prime divisors of a positive integer n . (For example, $C(10) = 2$, $C(11) = 1$, $C(12) = 2$).

Consider set S of all pairs of positive integers (a, b) such that $a \neq b$ and

$$C(a + b) = C(a) + C(b).$$

Is set S finite or infinite? .

(12 Marks)

$C(n)$ adalah pembahagi nombor perdana bagi integer positif n . (Contohnya, $C(10) = 2$, $C(11) = 1$, $C(12) = 2$).

Set S adalah set bagi kesemua pasangan integer positif (a, b) di mana $a \neq b$ dan

$$C(a + b) = C(a) + C(b).$$

Adakah S adalah set terhingga atau tak terhingga?

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3. A circle touches sides AB , BC , and CD of a parallelogram $ABCD$ at points K , L , and M respectively. Prove that the line KL bisects the height of the parallelogram drawn from the vertex C to AB . **(12 Marks)**

Sebuah bulatan menyentuh sisi AB , BC , dan CD bagi segiempat selari $ABCD$ masing-masing pada titik K , L , dan M . Buktikan bahawa garis KL membahagi dua sama bagi tinggi segiempat selari ini yang dilukis dari titik C ke sisi AB .

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4. Find the least positive integer n for which the product $1260 \cdot n$ is the cube of a natural number. **(12 Marks)**

Carikan integer positif terkecil n dimana hasil darab $1260 \cdot n$ adalah kuasa tiga bagi nombor asli.

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5. Solve the following radical equation,

$$\sqrt{3x+13} = x+1.$$

(12 Marks)

Selesaikan persamaan radikal berikut,

$$\sqrt{3x+13} = x+1.$$