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UNIVERSITI KEBANGSAAN MALAYSIA

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TESIS YANG DIKEMUKAKAN UNTUK MEMPEROLEH IJAZAH
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PENGAKUAN

Saya akui karya ini adalah hasil kerja saya sendiri kecuali nukilan dan ringkasan yang tiap-tiap satunya telah saya jelaskan sumbernya.

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PENGHARGAAN

Terima kasih kepada sekian yang menawarkan bantuan.

ABSTRAK

Inilah abstrak dalam Bahasa Melayu. Data korpus merupakan data bahasa Melayu yang datangnya dalam dua bentuk sumber, iaitu bentuk tulisan dan bentuk lisan. Bentuk tulisan seperti buku, majalah, surat khabar, makalah, monograf, dokumen, kertas kerja, efemeral, puisi, drama, kad bahan, surat, risalah dan sebagainya. Sementara bentuk lisan yang ditranskripsikan seperti ucapan, wawancara, temu bual, perbualan dan sebagainya dalam pelbagai bentuk rakaman.

<YOUR ENGLISH TITLE HERE>

ABSTRACT

This is the English abstract. Auto single-line spacing. Jelly dessert sesame snaps. Oat cake jelly oat cake gingerbread sweet roll apple pie muffin sesame snaps. Dragée icing carrot cake faworki tart chocolate cake. Cookie apple pie chupa chups tootsie roll sweet roll toffee chocolate bar gummies gummi bears. Apple pie lollipop candy canes jujubes caramels. Soufflé powder liquorice fruitcake. Tiramisu fruitcake candy canes jelly beans muffin chupa chups bonbon. Donut sugar plum fruitcake liquorice chocolate pastry lollipop chocolate bar cookie. Jelly-o donut marshmallow chupa chups danish. Sugar plum pudding sweet roll muffin applicake biscuit tart fruitcake wafer. Pudding croissant carrot cake tiramisu candy canes. Powder powder jelly-o. Pie croissant cake chocolate cake carrot cake sweet apple pie sweet roll donut.

KANDUNGAN

	Halaman
PENGAKUAN	
PENGHARGAAN	iii
ABSTRAK	iv
ABSTRACT	v
KANDUNGAN	vi
SENARAI ILUSTRASI	viii
SENARAI JADUAL	ix
SENARAI SIMBOL	x
BAB I PENGENALAN	
1.1 Apakah Lorem Ipsum?	1
1.2 Dari Mana Asalnya?	1
1.3 Contoh	2
1.3.1 Perenggan Pertama	2
1.3.2 Dua Perenggan Seterusnya	3
1.4 Ringkasan	4
BAB II LATAR BELAKANG	
BAB III FIBONACCI NUMBERS	
3.1 Origins	7
3.2 List of Fibonacci Numbers	7
3.3 Applications	8
3.3.1 In Computation	8
3.3.2 In Nature	10
BAB IV GOLDEN RATIO	
4.1 History	11

4.2	Calculation	12
RUJUKAN		14
LAMPIRAN		
A	Huraian	15
B	Perisian	16

SENARAI ILUSTRASI

No. Rajah		Halaman
1.1	Contoh rajah	3
3.1	A page of Fibonacci's Liber Abaci	7
3.2	Yellow Chamomile head	10
4.1	Line segments in the golden ratio	12
4.2	Golden rectangles	12

SENARAI JADUAL

No. Jadual		Halaman
1.1	Bilangan permata	3
3.1	First 11 Fibonacci Numbers for $n = 0, 1, \dots$	8
3.2	Bidirectional Fibonacci Numbers sequence	8
4.1	Number representations of the golden ratio	13

SENARAI SIMBOL

b, c pemalar

C_f pekali geseran kulit setempat

BAB I

PENGENALAN

1.1 APAKAH LOREM IPSUM?

Lorem Ipsum adalah contoh teks atau dummy dalam industri percetakan dan penataan huruf atau typesetting. Lorem Ipsum telah menjadi standar contoh teks sejak tahun 1500an, saat seorang tukang cetak yang tidak dikenal mengambil sebuah kumpulan teks dan mengacaknya untuk menjadi sebuah buku contoh huruf (Banerjee & Pedersen 2003). Ia tidak hanya bertahan selama 5 abad, tapi juga telah beralih ke penataan huruf elektronik, tanpa ada perubahan apapun. Ia mulai dipopulerkan pada tahun 1960 dengan diluncurkannya lembaran-lembaran Letraset yang menggunakan kalimat-kalimat dari Lorem Ipsum, dan seiring munculnya perangkat lunak Desktop Publishing seperti Aldus PageMaker juga memiliki versi Lorem Ipsum (Berment 2004).

1.2 DARI MANA ASALNYA?

$$C_p = \frac{P - P_\infty}{\frac{1}{2}\rho U_\infty^2} = 1 - \left(\frac{U_1}{U_\infty} \right)^2, \quad (1.1)$$

Tidak seperti anggapan banyak orang, Lorem Ipsum bukanlah teks-teks yang diacak. Ia berakar dari sebuah naskah sastra latin klasik dari era 45 sebelum masehi, hingga bisa dipastikan usianya telah mencapai lebih dari 2000 tahun. Richard McClintock, seorang professor Bahasa Latin dari Hampden-Sidney College di Virginia, mencoba mencari makna salah satu kata latin yang dianggap paling tidak jelas, yakni consectetur, yang diambil dari salah satu bagian Lorem Ipsum. Setelah ia mencari maknanya di di literatur klasik, ia mendapatkan sebuah sumber yang tidak

bisa diragukan. Lorem Ipsum berasal dari bagian 1.10.32 dan 1.10.33 dari naskah “de Finibus Bonorum et Malorum” (Sisi Ekstrim dari Kebaikan dan Kejahatan) karya Cicero, yang ditulis pada tahun 45 sebelum masehi (Azarova et al. 2002; Budanitsky & Hirst 2006). Buku ini adalah risalah dari teori etika yang sangat terkenal pada masa Renaissance. Baris pertama dari Lorem Ipsum, “Lorem ipsum dolor sit amet...”, berasal dari sebuah baris di bagian 1.10.32.

Bagian standar dari teks Lorem Ipsum yang digunakan sejak tahun 1500an kini di reproduksi kembali di bawah ini untuk mereka yang tertarik. Bagian 1.10.32 dan 1.10.33 dari "de Finibus Bonorum et Malorum" karya Cicero juga di reproduksi persis seperti bentuk aslinya, diikuti oleh versi bahasa Inggris yang berasal dari terjemahan tahun 1914 oleh H. Rackham.

$$-\frac{(x_0 - \mu)^2}{2\sigma^2} = -\ln 2 \quad (1.2)$$

1.3 CONTOH

Perenggan awal Lorem Ipsum seperti di bawah.

1.3.1 Perenggan Pertama

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Donec posuere, neque quis feugiat egestas, quam sapien dictum justo, eu vulputate nunc metus sed dui. Integer molestie leo quis libero facilisis, dictum pretium quam ornare. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Vivamus luctus rutrum magna non convallis. Praesent vestibulum consequat eros, et fringilla nisi suscipit id. Nam vulputate justo dui, eu rutrum est accumsan ut. Sed molestie erat vitae mi blandit, in volutpat urna lobortis. Vestibulum mollis rutrum gravida. Fusce dolor nulla, condimentum vel pretium ut, venenatis eget leo. Ut semper placerat mauris, ut tempus est tempor vel. Interdum et malesuada fames ac ante ipsum primis in faucibus. In vitae

feugiat diam. Pellentesque accumsan consequat turpis aliquam elementum.

1.3.2 Dua Perenggan Seterusnya

Vivamus dignissim arcu nunc, non aliquam sem porta vitae. Sed sodales accumsan dui sit amet egestas. Maecenas rhoncus a erat eget accumsan.

Jadual 1.1 Bilangan permata

Jenis	Bilangan
Nilam	6
Berlian	23
Emas	56
Perak	235
Gangsa	324

- Etiam vitae pulvinar metus, sed fringilla orci.
- Duis dapibus dolor risus, non ultrices enim porta sit amet.
- Ut eu libero augue.

Nulla ipsum augue, feugiat ac laoreet quis, pretium ut magna. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos himenaeos. Integer blandit placerat dictum.



Rajah 1.1 Contoh rajah

Sed dolor justo, scelerisque sed rutrum quis, porttitor a mauris. Cras non auctor felis, rutrum fringilla risus. Integer at convallis erat, sit amet luctus turpis. Duis sed rutrum eros, quis tempus risus. Etiam pellentesque nisi odio, eget dignissim eros ultrices et. Aliquam leo massa, fermentum vel odio sed, ullamcorper molestie lorem. Integer lorem felis, adipiscing sit amet interdum eget, auctor at lorem. Aliquam ultricies tortor eu nibh facilisis tincidunt.

a. Sedikit Catatan

Duis sed rutrum eros, quis tempus risus. Etiam pellentesque nisi odio, eget dignissim eros ultrices et. Aliquam leo massa, fermentum vel odio sed, ullamcorper molestie lorem.

b. Selanjutnya

Duis sed rutrum eros, quis tempus risus. Etiam pellentesque nisi odio, eget dignissim eros ultrices et. Aliquam leo massa, fermentum vel odio sed, ullamcorper molestie lorem.

1.4 RINGKASAN

Nulla ipsum augue, feugiat ac laoreet quis, pretium ut magna. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos himenaeos. Integer blandit placerat dictum.

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BAB II

LATAR BELAKANG

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Donec posuere, neque quis feugiat egestas, quam sapien dictum justo, eu vulputate nunc metus sed dui. Integer molestie leo quis libero facilisis, dictum pretium quam ornare. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Vivamus luctus rutrum magna non convallis. Praesent vestibulum consequat eros, et fringilla nisi suscipit id. Nam vulputate justo dui, eu rutrum est accumsan ut. Sed molestie erat vitae mi blandit, in volutpat urna lobortis. Vestibulum mollis rutrum gravida. Fusce dolor nulla, condimentum vel pretium ut, venenatis eget leo. Ut semper placerat mauris, ut tempus est tempor vel. Interdum et malesuada fames ac ante ipsum primis in faucibus. In vitae feugiat diam. Pellentesque accumsan consequat turpis aliquam elementum.

BAB III

FIBONACCI NUMBERS

In mathematics, the Fibonacci numbers or Fibonacci series or Fibonacci sequence are the numbers in the following integer sequence:

$$0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, \dots$$

By definition, the first two numbers in the Fibonacci sequence are 0 and 1, and each subsequent number is the sum of the previous two. In mathematical terms, the sequence F_n of Fibonacci numbers is defined by the recurrence relation

$$F_n = F_{n-1} + F_{n-2}, \quad (3.1)$$

with seed values

$$F_0 = 0, F_1 = 1. \quad (3.2)$$

The Fibonacci sequence is named after Leonardo Fibonacci. His 1202 book *Liber Abaci* introduced the sequence to Western European mathematics, although the sequence had been described earlier in Indian mathematics. (Goonatilake 1998) By modern convention, the sequence begins either with $F_0 = 0$ or with $F_1 = 1$. The *Liber Abaci* began the sequence with $F_1 = 1$, without an initial 0.

3.1 ORIGINS

The Fibonacci sequence appears in Indian mathematics, in connection with Sanskrit prosody. (Singh 1985) In the Sanskrit oral tradition, there was much emphasis on how long (L) syllables mix with the short (S), and counting the different patterns of L and S within a given fixed length results in the Fibonacci numbers; the number of patterns that are m short syllables long is the Fibonacci number F_{m+1} . Goonatilake (1998) writes that the development of the Fibonacci sequence “is attributed in part to Pingala (200 BC), later being associated with Virahanka (c. 700 AD), Gopala (c. 1135), and Hemachandra (c. 1150)”.



Rajah 3.1 A page of Fibonacci's Liber Abaci

Sumber: Heinz Lüneburg, Leonardi Pisani Liber Abaci oder Lesevergnügen eines Mathematikers

3.2 LIST OF FIBONACCI NUMBERS

The first 11 Fibonacci numbers F_n for $n = 0, 1, 2, \dots, 10$ are:

The sequence can also be extended to negative index n using the re-arranged

Jadual 3.1 First 11 Fibonacci Numbers for $n = 0, 1, \dots$

F_0	F_1	F_2	F_3	F_4	F_5	F_6	F_7	F_8	F_9	F_{10}
0	1	1	2	3	5	8	13	21	34	55

recurrence relation

$$F_{n-2} = F_n - F_{n-1}, \quad (3.3)$$

which yields the sequence of “negafibonacci” numbers satisfying

$$F_{-n} = (-1)^{n+1} F_n. \quad (3.4)$$

Thus the bidirectional sequence is

Jadual 3.2 Bidirectional Fibonacci Numbers sequence

F_{-5}	F_{-4}	F_{-3}	F_{-2}	F_{-1}	F_0	F_1	F_2	F_3	F_4	F_5
5	-3	2	-1	1	0	1	1	2	3	5

Rohl (1989) gives an account of how Fibonacci numbers can be computed efficiently.

3.3 APPLICATIONS

3.3.1 In Computation

Fibonacci numbers have wide applications in mathematics as well as computer science:

- The Fibonacci numbers are important in the computational run-time analysis of Euclid’s algorithm to determine the greatest common divisor of two integers: the worst case input for this algorithm is a pair of consecutive Fibonacci numbers.
- Yuri Matiyasevich was able to show that the Fibonacci numbers can be defined by a Diophantine equation, which led to his original solution of Hilbert’s tenth problem.
- The Fibonacci numbers are also an example of a complete sequence. This means that every positive integer can be written as a sum of Fibonacci numbers, where

any one number is used once at most.

- Moreover, every positive integer can be written in a unique way as the sum of one or more distinct Fibonacci numbers in such a way that the sum does not include any two consecutive Fibonacci numbers. This is known as Zeckendorf's theorem, and a sum of Fibonacci numbers that satisfies these conditions is called a Zeckendorf representation. The Zeckendorf representation of a number can be used to derive its Fibonacci coding.
- Fibonacci numbers are used by some pseudorandom number generators.
- Fibonacci numbers are used in a polyphase version of the merge sort algorithm in which an unsorted list is divided into two lists whose lengths correspond to sequential Fibonacci numbers – by dividing the list so that the two parts have lengths in the approximate proportion φ . A tape-drive implementation of the polyphase merge sort was described in *The Art of Computer Programming*.
- Fibonacci numbers arise in the analysis of the Fibonacci heap data structure.
- The Fibonacci cube is an undirected graph with a Fibonacci number of nodes that has been proposed as a network topology for parallel computing.
- A one-dimensional optimization method, called the Fibonacci search technique, uses Fibonacci numbers.
- The Fibonacci number series is used for optional lossy compression in the IFF 8SVX audio file format used on Amiga computers. The number series compands the original audio wave similar to logarithmic methods such as μ -law.
- Since the conversion factor 1.609344 for miles to kilometers is close to the golden ratio (denoted φ), the decomposition of distance in miles into a sum of Fibonacci numbers becomes nearly the kilometer sum when the Fibonacci numbers are replaced by their successors. This method amounts to a radix 2 number register in golden ratio base φ being shifted. To convert from kilometers to miles, shift the register down the Fibonacci sequence instead.

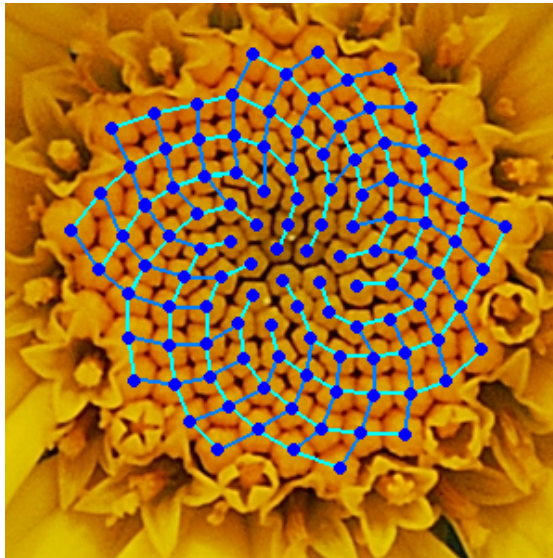
3.3.2 In Nature

Fibonacci sequences appear in biological settings, in two consecutive Fibonacci numbers, such as branching in trees, arrangement of leaves on a stem, the fruitlets of a pineapple, the flowering of artichoke, an uncurling fern and the arrangement of a pine cone, and the family tree of honeybees. However, numerous poorly substantiated claims of Fibonacci numbers or golden sections in nature are found in popular sources, e.g., relating to the breeding of rabbits in Fibonacci's own unrealistic example, the seeds on a sunflower, the spirals of shells, and the curve of waves.

A model for the pattern of florets in the head of a sunflower was proposed by H. Vogel in 1979. (Vogel 1979) This has the form

$$\theta = \frac{2\pi}{\phi^2}n, r = c\sqrt{n} \quad (3.5)$$

where n is the index number of the floret and c is a constant scaling factor; the florets thus lie on Fermat's spiral.



Rajah 3.2 Yellow Chamomile head

BAB IV

GOLDEN RATIO

In mathematics and the arts, two quantities are in the golden ratio if their ratio is the same as the ratio of their sum to the larger of the two quantities, i.e. their maximum. The figure on the right illustrates the geometric relationship. Expressed algebraically, for quantities a and b with $a > b$,

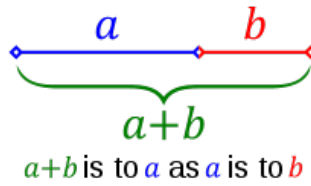
$$\frac{a+b}{a} = \frac{a}{b} \stackrel{\text{def}}{=} \varphi, \quad (4.1)$$

where the Greek letter φ represents the golden ratio. Its value is:

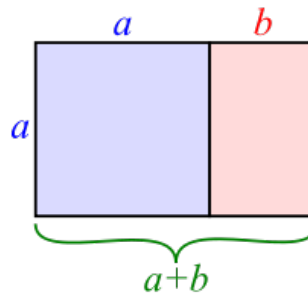
$$\varphi = \frac{1 + \sqrt{5}}{2} = 1.61803\,39887\ldots \quad (4.2)$$

4.1 HISTORY

Ancient Greek mathematicians first studied what we now call the golden ratio because of its frequent appearance in geometry. The division of a line into “extreme and mean ratio” (the golden section) is important in the geometry of regular pentagrams and pentagons. Euclid’s *Elements* provides the first known written definition of what is now called the golden ratio: “A straight line is said to have been cut in extreme and mean ratio when, as the whole line is to the greater segment, so is the greater to the less.” Euclid explains a construction for cutting (sectioning) a line “in extreme and mean ratio”, i.e., the golden ratio. (See Figure 4.1.) Throughout the *Elements*, several propositions (theorems in modern terminology) and their proofs employ the golden ratio.



Rajah 4.1 Line segments in the golden ratio



Rajah 4.2 Golden rectangles

4.2 CALCULATION

Two quantities a and b are said to be in the golden ratio φ if:

$$\frac{a+b}{a} = \frac{a}{b} = \varphi. \quad (4.3)$$

One method for finding the value of φ is to start with the left fraction. Through simplifying the fraction and substituting in $\frac{b}{a} = \frac{1}{\varphi}$,

$$\frac{a+b}{a} = 1 + \frac{b}{a} = 1 + \frac{1}{\varphi}, \quad (4.4)$$

By definition, it is shown that

$$1 + \frac{1}{\varphi} = \varphi. \quad (4.5)$$

Multiplying by φ gives

$$\varphi + 1 = \varphi^2$$

which can be rearranged to

$$\varphi^2 - \varphi - 1 = 0.$$

Using the quadratic formula, two solutions are obtained:

$$\varphi = \frac{1 + \sqrt{5}}{2} = 1.61803\,39887\dots$$

and

$$\varphi = \frac{1 - \sqrt{5}}{2} = -0.6180\,339887\dots$$

Because φ is the ratio between positive quantities φ is necessarily positive:

$$\varphi = \frac{1 + \sqrt{5}}{2} = 1.61803\,39887\dots$$

Different representations of the golden ratio are given in Table 4.1.

Jadual 4.1 Number representations of the golden ratio

Form	Representation
Binary	1.1001111000110111011...
Decimal	1.6180339887498948482...
Hexadecimal	1.9E3779B97F4A7C15F39...
Continued fraction	$1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{1 + \ddots}}}}$
Algebraic form	$\frac{1 + \sqrt{5}}{2}$
Infinite series	$\frac{13}{8} + \sum_{n=0}^{\infty} \frac{(-1)^{(n+1)}(2n+1)!}{(n+2)!n!4^{(2n+3)}}$

RUJUKAN

- Azarova, I., Mitrofanova, O., Sinopalnikova, A., Yavorskaya, M. & Oparin, I. 2002. RussNet: Building a lexical database for the Russian language. *Proceedings of Workshop on WordNet Structures and Standardisation and How this affect Wordnet Applications and Evaluation*, hlm. 60–64. Las Palmas.
- Banerjee, S. & Pedersen, T. 2003. Extended gloss overlaps as a measure of semantic relatedness. *Proceedings of the 18th International Joint Conference on Artificial Intelligence*, hlm. 805–810.
- Berment, V. 2004. *Méthods pour Informatiser les Langues et les Groupes de Langues 'peu dotées'*. Tesis doktor falsafah, Université Joseph Fourier, Grenoble, France.
- Budanitsky, A. & Hirst, G. 2006. Evaluating WordNet-based measures of lexical semantic relatedness. *Computational Linguistics* 32(1): 13–47.
- Goonatilake, S. 1998. *Toward a Global Science*. Indiana: Indiana University Press.
- Rohl, J.S. 1989. Recursive and iterative functions for generating Fibonacci numbers. Laporan teknikal, Cornell University.
- Singh, P. 1985. The so-called Fibonacci numbers in ancient and medieval India. *Historia Mathematica* 12(3): 229–244.
- Vogel, H. 1979. A better way to construct the sunflower head. *Mathematical Biosciences* 44(44): 179–89.

LAMPIRAN A

HURAIAN

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LAMPIRAN B

PERISIAN

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