

MINISTRY OF EDUCATION, SINGAPORE
in collaboration with
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE
General Certificate of Education Advanced Level
Higher 2

MATHEMATICS

Paper 2
SPECIMEN PAPER

9758/02

For Examination from 2017
3 hours

- 1 (i) The function f is defined as follows:

$$f: x \mapsto 3 \cos x - 2 \sin x, x \in \mathbb{R}, -\pi \leq x \leq \pi$$

Write $f(x)$ as $R \cos(x + \alpha)$, where R and α are constants to be found. Hence, or otherwise, find the range of f and sketch the curve. [4]

- (ii) The function g is defined as follows:

$$g: x \mapsto 3 \cos x - 2 \sin x, x \in \mathbb{R}, -a \leq x \leq b.$$

Given that the function g^{-1} exists, write down the largest value of b . Find $g^{-1}(x)$. [3]

i).

$$f(x) = 3 \cos x - 2 \sin x$$

$$\text{Let } R \cos(x + \alpha) = 3 \cos x - 2 \sin x$$

$$R \cos x \cos \alpha - R \sin x \sin \alpha = 3 \cos x - 2 \sin x$$

By Comparing Coefficients:

$$R \cos \alpha = 3 \quad \text{①}$$

$$R \sin \alpha = 2 \quad \text{②}$$

$$\frac{\text{②}}{\text{①}}: \tan \alpha = \frac{2}{3}$$

$$\alpha = \tan^{-1} \frac{2}{3} = 0.588 \text{ radian.}$$

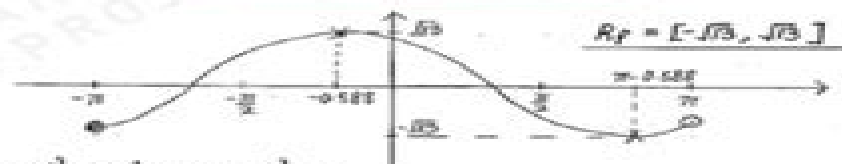
$$\text{①}^2 + \text{②}^2: R^2 \cos^2 \alpha + R^2 \sin^2 \alpha = 3^2 + 2^2$$

$$\therefore R^2 = 13$$

$$R = \sqrt{13}$$

$$\text{Hence, } f(x) = \sqrt{13} \cos(x + 0.588)$$

This method works for those who do not remember their R-Formulae



- ii). from the above graph,
 $b = \pi - 0.588$

$$\text{Let } y = \sqrt{13} \cos(x + 0.588)$$

$$\cos^{-1}\left(\frac{y}{\sqrt{13}}\right) = x + 0.588$$

$$\therefore x = -0.588 + \cos^{-1}\left(\frac{y}{\sqrt{13}}\right)$$

$$g^{-1}(x) = -0.588 + \cos^{-1}\left(\frac{y}{\sqrt{13}}\right), -\sqrt{13} \leq x \leq \sqrt{13}$$

2007 A Level Math Solutions Paper 2

**J. Michael Spector, M. David Merrill, Jan
Elen, M. J. Bishop**



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O-level Mathematics Challenging Exam Solutions (Yellowreef) Thomas Bond,Chris Hughes,2013-11-28 10 sets of complete solutions to the challenging examination questions full and complete mark schemes and exam reports are included for the candidate to review his her answers best used just before taking the actual examination complete edition eBook available , *Mathematical Reviews* ,2007 *Future of Software Engineering 2007* Lionel C. Briand,Alexander L. Wolf,2007 *Numerical Solution of Partial Differential Equations: Theory, Algorithms, and Their Applications* Oleg P. Iliev,Svetozar D. Margenov,Peter D Minev,Panayot S. Vassilevski,Ludmil T Zikatanov,2013-06-04 One of the current main challenges in the area of scientific computing is the design and implementation of accurate numerical models for complex physical systems which are described by time dependent coupled systems of nonlinear PDEs This volume integrates the works of experts in computational mathematics and its applications with a focus on modern algorithms which are at the heart of accurate modeling adaptive finite element methods conservative finite difference methods and finite volume methods and multilevel solution techniques Fundamental theoretical results are revisited in survey articles and new techniques in numerical analysis are introduced Applications showcasing the efficiency reliability and robustness of the algorithms in porous media structural mechanics and electromagnetism are presented Researchers and graduate students in numerical analysis and numerical solutions of PDEs and their scientific computing applications will find this book useful **College Board College Handbook 2007** College Entrance Examination Board,2006-06 The easy way to find and compare schools FAST Includes every accredited college in the U S 2 140 4 year colleges and universities 1 660 2 year community colleges and technical schools completely updated for 2007 Teaching Children Mathematics ,2008-08 **Children's Books in Print, 2007** ,2006 **Dynamics in Logistics** Hans-Jörg Kreowski,Bernd Scholz-Reiter,Klaus-Dieter Thoben,2013-03-28 The volume comprises the proceedings of the third International Conference on Dynamics in Logistics LDIC 2012 The scope of the conference targeted the identification analysis and description of the dynamics of logistic processes and networks The spectrum ranged from the modeling and planning of processes and innovative methods like autonomous control and knowledge management to the new technologies provided by radio frequency identification mobile communication and networking The growing dynamics in the area of logistics poses completely new challenges Logistic processes and networks must rapidly and flexibly adapt to continuously changing conditions LDIC 2012 provided a venue for researchers from academia and industry interested in the technical advances in dynamics in logistics The conference addressed research in logistics from a wide range of fields e g engineering computer science and operations research The volume consists of two invited papers and of 49 contributed papers divided into various subjects including transport logistics routing in dynamic logistic networks modeling simulation optimization and collaboration in logistics identification technologies mathematical modeling in transport and production logistics information communication risk and failure in logistic systems autonomous

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