

ERRATA

MATHEMATICS FOR AUSTRALIA 12

Specialist Mathematics

First edition - 2017 first reprint

The following erratum was made on 10/May/2022

page 84 CHAPTER 4 HISTORICAL NOTE, second paragraph should read:

Historical note

Euler's beautiful equation

One of the most remarkable results in mathematics is known as **Euler's beautiful equation** $e^{i\pi} = -1$ named after **Leonhard Euler**.

It is called beautiful because it links together three great constants of mathematics: Euler's **number** e ; the imaginary number i ; and the ratio of a circle's circumference to its diameter, π .

The beautiful equation comes from Euler's more general result: $e^{i\theta} = \cos \theta + i \sin \theta$, $\theta \in \mathbb{R}$.

The following erratum was made on 28/Oct/2021

page 333 ANSWERS EXERCISE 9E.2 Question 4 d, should read:

4 d $\approx (-12.8, 7.18)$, speed $\approx 3.39 \text{ m s}^{-1}$

The following errata were made on 28/Apr/2020

page 183 **EXERCISE 6K** Question **6**, should be arranged into parts accordingly:

- 6** Consider the system of equations
$$\begin{cases} 2x + y - z = 3 \\ mx - 2y + z = 1 \\ x + 2y + mz = -1 \end{cases} \quad \text{where } m \text{ is a real number.}$$
- a** Reduce the system to a form in which the solutions may be determined for all real values of m .
 - b** Show that the system has no solutions for one value of m . Interpret this result geometrically.
 - c** Show that there are infinitely many solutions for another value of m . Interpret this result geometrically.
 - d**
 - i** For what values of m does the system have a unique solution? Interpret this result geometrically.
 - ii** Show that the unique solution is $x = \frac{7}{m+5}$, $y = \frac{3(m-2)}{m+5}$, $z = \frac{-7}{m+5}$.

page 322 **ANSWERS EXERCISE 6K** Question **6**, should be arranged into parts accordingly:

- 6 a**
$$\left[\begin{array}{ccc|c} 1 & 2 & m & -1 \\ 0 & -2(m+1) & 1-m^2 & 1+m \\ 0 & 0 & (m+1)(m+5) & -7(m+1) \end{array} \right]$$
- b** If $m = -5$, no solution. The line of intersection of any two planes is parallel to the third.
 - c** If $m = -1$, infinitely many solutions. Two planes are coincident and the third meets in a line.
 - d i** If $m \neq -5$ or -1 , there is a unique solution. The planes meet at a point.

page 327 **ANSWERS EXERCISE 8E** Question **2 e** and **f**, should read:

- 2 a** $y = Ae^x$
- b** $y = \pm\sqrt{2x+c}$
- c** $y = Ae^t + 4$
- d** $P = \left(\frac{3}{2}t + c\right)^2$
- e** $Q = Ae^{2t} - \frac{3}{2}$
- f** $Q = -\frac{3}{2} \pm \sqrt{t+c}$

The following erratum was made on 23/Dec/2019

page 67 **SECTION 3D**, green box should include caveats:

From the **Investigation**, you should have observed that:

- zeros of $y = f(x)$ become vertical asymptotes of $y = \frac{1}{f(x)}$
- vertical asymptotes of $y = f(x)$ become zeros of $y = \frac{1}{f(x)}$
- local maxima of $y = f(x)$, $f(x) \neq 0$ become local minima of $y = \frac{1}{f(x)}$
- local minima of $y = f(x)$, $f(x) \neq 0$ become local maxima of $y = \frac{1}{f(x)}$
- when $f(x) > 0$, $\frac{1}{f(x)} > 0$ and when $f(x) < 0$, $\frac{1}{f(x)} < 0$
- when $f(x) \rightarrow 0$, $\frac{1}{f(x)} \rightarrow \pm\infty$ and when $f(x) \rightarrow \pm\infty$, $\frac{1}{f(x)} \rightarrow 0$.

The following erratum was made on 16/Sep/2019

page 328 **ANSWERS EXERCISE 8E** Question **4 e**, should read:

$$\mathbf{4 \ e} \quad y = \ln \left[\sqrt[4]{|2x^2 + 4x + 1|} (e^2 + 3) - 3 \right]$$

The following errata were made on 12/Jul/2019

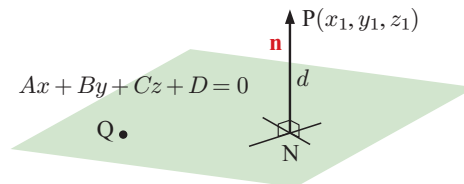
page 14 **EXERCISE 1B** Question **5**, should read:

5 The n th term of the sequence $3, \frac{4}{3}, \frac{11}{18}, \dots$ is given by $t_n = a \left(\frac{1}{3}\right)^n + b \left(\frac{1}{2}\right)^n$.

page 174 **EXERCISE 6H** Question **17**, diagram should have **n** label:

17 Suppose Q is any point in the plane $Ax + By + Cz + D = 0$. Let d be the distance from $P(x_1, y_1, z_1)$ to the given plane.

a Explain why $d = \frac{|\vec{QP} \cdot \mathbf{n}|}{|\mathbf{n}|}$.



page 305 **ANSWERS REVIEW SET 2A** Question **11**, should read:

11 $P(z) = a(z^4 - 6z^3 + 14z^2 - 10z - 7)$, $a \in \mathbb{Q}$, $a \neq 0$

page 327 **ANSWERS EXERCISE 8B** Question **10**, should read:

10 a 0.2 m s^{-1} **b** $\frac{4}{45} \text{ m s}^{-1}$

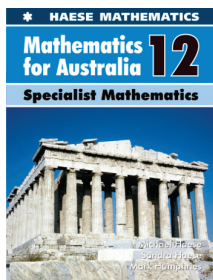
The following errata were made on 27/Feb/2018

page 197 **EXERCISE 7A** Question **16**, should integrate with respect to x :

16 Evaluate $\int_{-1}^1 e^{-x^2} dx$ using technology.

page 317 **ANSWERS EXERCISE 5E** Question **3**, should read:

3 $\vec{QS} = 2\vec{PR}$, $PR : QS = 1 : 2$



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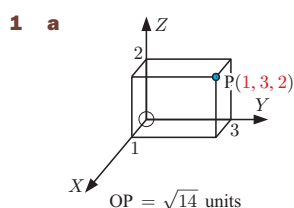
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The following errata were made on 13/Nov/2017

page 318 **ANSWERS EXERCISE 5I.1** Question **8 d**, should not be a vector:

8 a $a \times b$ **b** 0 **c** $2(b \times a)$ **d** 0

page 318 **ANSWERS REVIEW SET 5A** Question **1 a**, point coordinates should read:



The following errata were made on 31/Aug/2017

page 201 **EXERCISE 7B** Questions **9 a** and **f**, should read:

9 Find:

a $\int_{-\frac{\sqrt{3}}{2}}^{\frac{\sqrt{3}}{2}} \frac{1}{\sqrt{1-x^2}} dx$

b $\int_0^{\frac{1}{2}} -\frac{2}{\sqrt{1-x^2}} dx$

c $\int_1^{\sqrt{3}} \frac{3}{1+x^2} dx$

d $\int_{-\sqrt{3}}^0 \frac{5}{\sqrt{4-x^2}} dx$

e $\int_{-3}^{\sqrt{3}} \frac{6}{9+x^2} dx$

f $\int_{-1}^0 -\frac{1}{\sqrt{2-x^2}} dx$

The following errata were made on 26/Jul/2017

page 302 **ANSWERS EXERCISE 1B** Question **8 d**, hint should read:

8 d Hint: Show that $(A_{k+1})^2 - 3(B_{k+1})^2 = (A_k)^2 - 3(B_k)^2$
for any positive integer k .

page 302 **ANSWERS EXERCISE 2C** Question **2 b**, should have only one solution:

2 a $a = 2, b = -2$ or $a = -2, b = 2$
b $a = 2, b = -1$

page 303 **ANSWERS EXERCISE 2G** Questions **4** and **6**, should read:

4 $a = -13, b = 34$, other **roots** are $3 - i, -2 \pm \sqrt{3}$

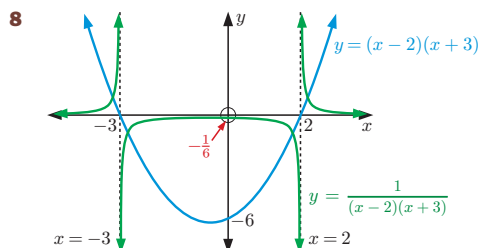
5 $a = 3, P(z) = (z+3)(z+i\sqrt{3})(z-i\sqrt{3})$

6 $a = -4, b = 15$, other **roots** are $2 - i, \pm i\sqrt{3}$

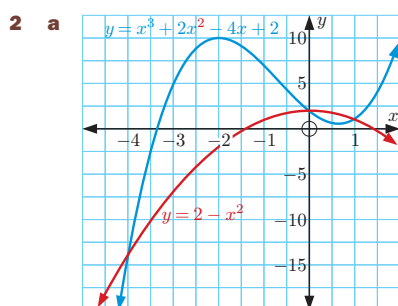
page 307 **ANSWERS EXERCISE 3B** Question **10 c**, should read:

- 10 a** If a horizontal line cuts f more than once, a vertical line will cut its reflection in $y = x$ more than once, and so the reflection of f in $y = x$ will not be a function.
- b i** is the only one.
- c ii** Domain = $\{x \mid x \geq 1\}$ or $\{x \mid x \leq 1\}$
iii Domain = $\{x \mid x \geq 1\}$ or $\{x \mid x \leq -2\}$

page 311 **ANSWERS REVIEW SET 3A** Question **8**, should have correct y -axis intercept:



page 325 **ANSWERS EXERCISE 7E** Question **2 a**, should have correct graph label:



page 327 **ANSWERS EXERCISE 8B** Question **14**, is not an approximation:

- 14** increasing at 0.128 radians per second

page 327 **ANSWERS EXERCISE 8E** Questions **1 b**, **h**, and **3 a**, should read:

- 1 a** $y = \sqrt[3]{\frac{3}{2}x^2 + c}$ **b** $y = \ln(x^2 + c)$ **c** $y = Ae^{\frac{3}{2}x^2}$
d $y = \left(\frac{x^2}{2} + c\right)^2$ **e** $y = Ae^{-\cos x}$
f $y = \left(-\frac{1}{4}x^2 + c\right)^2 - 1$ **g** $y = Ax$
h $y = -\ln(c - x^3)$ **i** $y = A(x - 1) - 2$
2 a $y = Ae^x$ **b** $y = \pm\sqrt{2x + c}$ **c** $y = Ae^t + 4$
d $P = \left(\frac{3}{2}t + c\right)^2$ **e** $Q = Ae^t - \frac{3}{2}$ **f** $t = Q^2 + 3Q + c$
3 a $y = Ae^{\arctan x}$ **b** $y = Ae^{2x} + 2$
c $y = \sqrt[3]{3\ln(x^2 + 5) + c}$ **d** $y = 1 + Ae^{-\arcsin(\frac{x}{2})}$

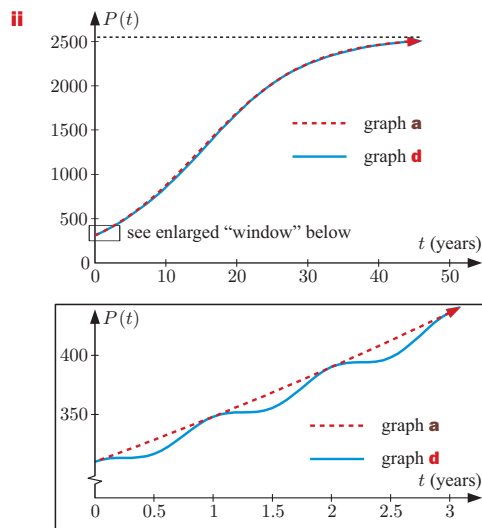
page 328 **ANSWERS EXERCISE 8E** Question **4 e**, should read:

- 4 e** $y = \ln \left[\sqrt[4]{2x^2 + 4x + 1} (e^2 + 3) - 3 \right]$

page 329 **ANSWERS EXERCISE 8J** Question **4 b**, should read:

- 4 b** When $x = 0$, $v^2 = k^2 A^2$
 $\therefore$ maximum speed = $k|A|$

12 d i $P = \frac{2550}{1 + 7.380e^{-0.133t} - 0.0212 \cos 2\pi t}$



The following erratum was made on 20/Mar/2017

page 260 **EXERCISE 8I** Question **3**, should use correct units:

- 3** An object with displacement x cm moves with acceleration $a = 12\sqrt{x} \text{ cm s}^{-2}$. The object is initially at the origin O, moving with velocity 3 cm s^{-1} .
- a** Show that $v^2 = 16x^{\frac{3}{2}} + 9$.
 - b** Find the location of the object when its velocity is 5 cm s^{-1} .
 - c** Find the speed of the object when it is 9 cm to the right of O.

The following erratum was made on 27/Feb/2017

page 66 **EXERCISE 3C** Question **2**, should read:

- 2** Prove that $y = \frac{k}{x}$ is a self-inverse function for all $k \in \mathbb{R}$, $k \neq 0$.

The following errata were made on 03/Feb/2017

page 15 **EXERCISE 1B** Question **13**, replace entirely with:

- 13** A sequence is defined by $t_n = 3n^2$ for $n \in \mathbb{Z}^+$. Use the principle of mathematical induction to show that $\sum_{i=1}^n t_i = \frac{n(n+1)(2n+1)}{2}$.

page 302 **ANSWERS EXERCISE 1B** Question **10 b**, replace hint with:

- 10 a Hint:** $\cos A \sin B = \frac{1}{2} [\sin(A+B) - \sin(A-B)]$
- b Hint:** Use the double angle formulae.
- d Hint:** See hint for **a**.