tUNEup
Basic Mathematics and Statistics

Teaching and Learning Centre
Academic Skills Office
Armidale, NSW 2351
Australia

Acknowledgements

The content of topics 1 to 12 is based on an early edition of a help book first published in 1982 by the staff of Mathematics, Statistics and Computing Science. It has been substantially revised and additional topics added in 2007 by the staff of the Teaching and Learning Centre. Topic 13 was written by Dr Gerd Schmalz as part of the unit MATH 123. Topics 14-15 are web links to Wikipedia The free online encyclopaedia. Topics 16 and 17 are extracts from the recommended text Kruglak.

Margaret McDonald the Office Manager of the Mathematics, Statistics and Computer Science School re-typed the text in LaTeX. Norman Gaywood from Mathematics, Statistics and Computer Science created the figures.

Introduction

0.1 Why do I need to study mathematics and statistics?

In the course you are studying you will need to use either basic mathematics or more advanced mathematics to be able to carry out tasks fundamental to learning your chosen discipline as well as tasks you will undertake as part of your future employment. For example, nurses need to know how to convert dosages from one form of measure to another in order to correctly administer medication to patients. Scientists and agricultural economists need to know how certain models might work in order to recommend appropriate choices to land managers or policy makers and to solve a wide range of problems with unknown elements.

Being able to interpret statistical data and inferences drawn from its analysis allows you to evaluate conclusions in subjects as diverse as philosophy and health, make appropriate life choices or even just to participate as an informed citizen in society.

UNE believes that numeracy and statistical literacy are part of your ability to communicate in a range of contexts. As such it is a fundamental attribute all graduates should be able to demonstrate.

0.2 Aim

The aim of these resources is to:

- provide material for those who wish to refresh their memory on fundamental facts and processes of elementary mathematics and statistics
- provide clear, step by step explanations of basic mathematical and statistical concepts
- give confidence to, and hopefully to break down psychological barriers for the student who has had difficulties with, or is even fearful of aspects of mathematics and statistics.

Of these purposes the third is the more important. However, the removal of mathematical weaknesses may not be achieved by the written word alone. Therefore, seek help from a learning advisor from the Academic Skills Office if you are in difficulties.

0.3 How to use these resources

This brief overview is not meant to be a text book. Its brevity is deliberate with the amount of explanation carefully considered. If you are having difficulties, saying an explanation or definition aloud may help you understand the concept. Making a sentence of an explanation written as symbols sometimes helps as well. Each topic builds on the preceding topic with the topics ordered from basic mathematics to more advanced topics. Some topics such as calculus are only required by those studying science or economics subjects so check which topics are required for your degree.

Italics are used for definitions and new terminology. Important mathematical relationships appear in boxes for extra emphasis and for ease of referral. Exercises are included as an important part of the learning so that you can gauge your understanding. Before looking at the solutions, check your calculation. You may think you have been careful, but it is surprising how easily mistakes can occur. If you find you are unable to successfully complete the exercises in any topic go back over the topic before proceeding further. You will find answers to all of the exercises at the end of each topic. There is an overall diagnostic set of questions (and answers) as a final check of your learning.

If you need any additional explanation try the recommended books and links below or contact the Academic Skills Office for a personal consultation (ring extension 3600 or email `asohelp@une.edu.au`).

0.4 One last tip: Go over your work.

Unfortunately, some students end up with the impression that it is not necessary to check your work–just write it up once, and hope that it's correct. But that's nonsense. All of us make mistakes sometimes. In any subject, if you want to do good work, you have to work carefully, and then you have to check your work. In English, this is called "proofreading"; in computer science, this is called "debugging." In mathematics, checking your work is an important part of the learning process. Sure, you'll learn what you did wrong when you get your assignment back from the marker; but you'll learn the subject much better if you try very hard to make sure that your answers are right before you submit your answers.

0.5 Recommended texts

- Kruglak, H., Moore J.T., *Mata-Toledo R. 1998, Basic Mathematics with applications to science and technology*, 2nd edn, McGraw-Hill, USA. Library reference: Q510 K94s

  This book covers all of the basics including probability and statistics. It does not cover Matrices, Calculus and Set theory.

- Glaister, K. 1997, *Medication Mathematics, MacMillan Education Australia*, Melb. Library reference: 615.4, G544m.

  While this book is written for nursing students, Chapter 1, 'Mathematical Manipulations', has excellent, very easy to follow explanations for calculations, working with fractions, decimals, ratios and powers of ten.

- `http://www.maths.mq.edu.au/numeracy/reviewbasicmaths.pdf`

- `http://www.maths.mq.edu.au/numeracy/tutorial/contents.htm`
  The graphing link explains basic statistics terminology.

- `http://www.dlsweb.rmit.edu.au/lsu/content/3_MathsEssentials/00maths.htm`
  A good resource with online tutorials and printable handouts.

- `http://en.wikipedia.org/wiki/Algebra`

- `http://en.wikipedia.org/wiki/Calculus`

- `http://en.wikipedia.org/wiki/Set_theory`

- `http://en.wikipedia.org/wiki/List_of_basic_statistics_topics`

- Murison, R.D. 2005, *Statistical Modelling in the Sciences*, Pearson Education Australia. Library reference: 519.5, M977s

Bachelor of Nursing

- Glaister, K. 1997, *Medication Mathematics, MacMillan Education Australia*, Melb. Library reference: 615.4, G544m

- `http://nursing.flinders.edu.au/students/studyaids/drugcalculations/`
  An extremely comprehensive resource, including metrics and conversion of units of measurement.

- Nursing Calculations CD ROM 2002-2004, Educational Innovations,
  `http://www.educinnov.com.au`
  Available for purchase from your lecturers.