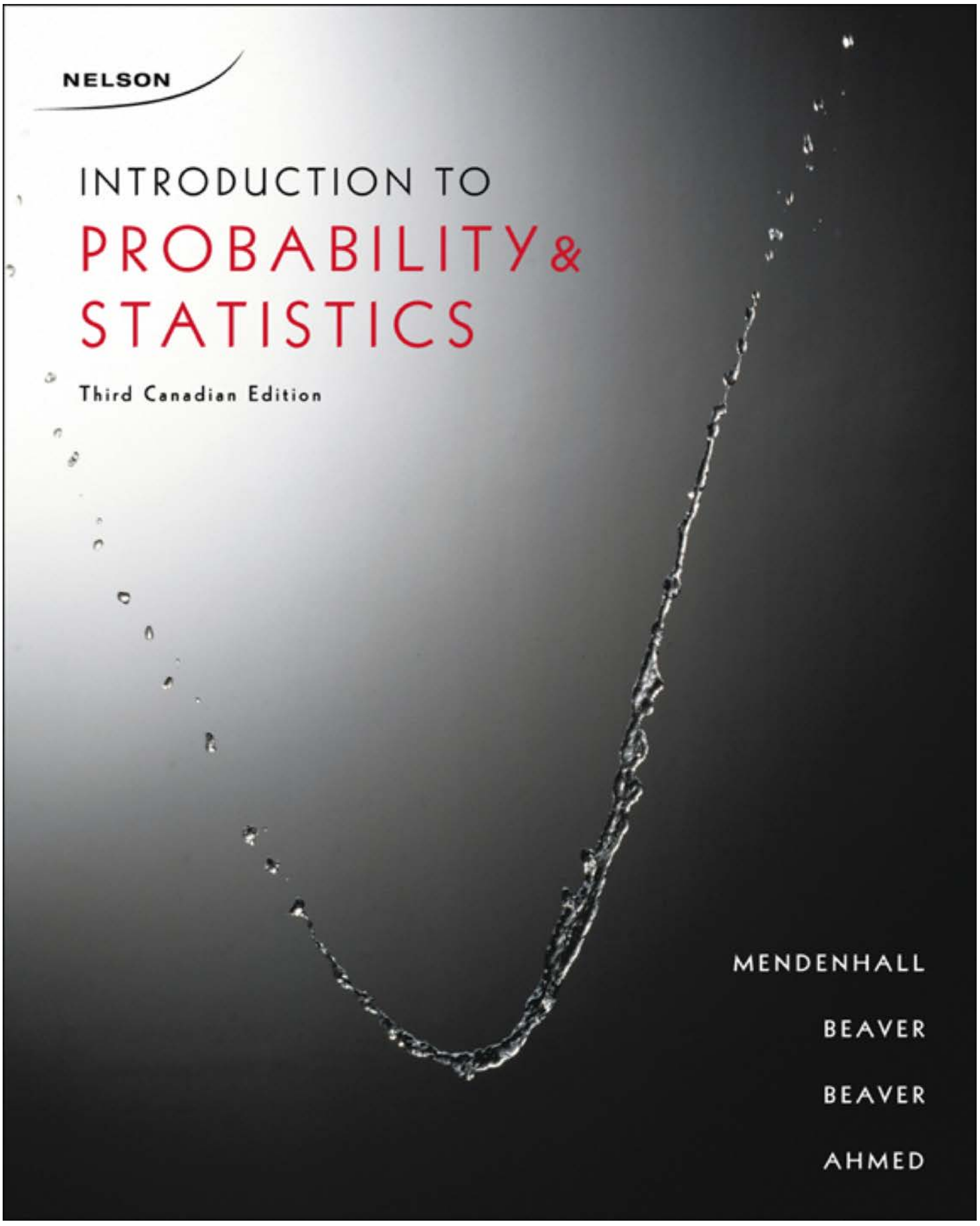
NELSON

INTRODUCTION TO PROBABILITY & STATISTICS

Third Canadian Edition



MENDENHALL

BEAVER

BEAVER

AHMED

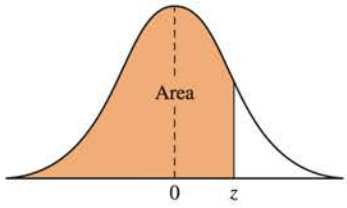


TABLE 3 Areas under the Normal Curve, pages 720–721

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
−3.4	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002
−3.3	0.0005	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0003
−3.2	0.0007	0.0007	0.0006	0.0006	0.0006	0.0006	0.0006	0.0005	0.0005	0.0005
−3.1	0.0010	0.0009	0.0009	0.0009	0.0008	0.0008	0.0008	0.0008	0.0007	0.0007
−3.0	0.0013	0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0011	0.0010	0.0010
−2.9	0.0019	0.0018	0.0017	0.0017	0.0016	0.0016	0.0015	0.0015	0.0014	0.0014
−2.8	0.0026	0.0025	0.0024	0.0023	0.0023	0.0022	0.0021	0.0021	0.0020	0.0019
−2.7	0.0035	0.0034	0.0033	0.0032	0.0031	0.0030	0.0029	0.0028	0.0027	0.0026
−2.6	0.0047	0.0045	0.0044	0.0043	0.0041	0.0040	0.0039	0.0038	0.0037	0.0036
−2.5	0.0062	0.0060	0.0059	0.0057	0.0055	0.0054	0.0052	0.0051	0.0049	0.0048
−2.4	0.0082	0.0080	0.0078	0.0075	0.0073	0.0071	0.0069	0.0068	0.0066	0.0064
−2.3	0.0107	0.0104	0.0102	0.0099	0.0096	0.0094	0.0091	0.0089	0.0087	0.0084
−2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110
−2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143
−2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183
−1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233
−1.8	0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294
−1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367
−1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455
−1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559
−1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0722	0.0708	0.0694	0.0681
−1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823
−1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985
−1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170
−1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379
−0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611
−0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867
−0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148
−0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451
−0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776
−0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121
−0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483
−0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859
−0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247
−0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641

TABLE 3 *(continued)*

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998

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NELSON EDUCATION

Introduction to Probability and Statistics

THIRD CANADIAN EDITION

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by William Mendenhall, Robert J. Beaver, Barbara M. Beaver, and S. Ejaz Ahmed

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Brief Contents

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NEED TO KNOW

Preface

Every time you pick up a newspaper or a magazine, when you watch TV, or surf the Internet, you encounter statistics. Every time you fill out a questionnaire, register at an online website, or pass your grocery rewards card through an electronic scanner, your personal information becomes part of a database containing your personal statistical information. You cannot avoid the fact that in this information age, data collection and analysis are an integral part of our day-to-day activities. In order to be an educated consumer and citizen, you need to understand how statistics are used and misused in our daily lives. To that end we need to "train your brain" for statistical thinking—a theme we emphasize throughout the Third Canadian Edition.

THE SECRET TO OUR SUCCESS

The first course in introductory statistics that we ever took used *Introduction to Probability and Statistics* by William Mendenhall. Since that time, this text—now in a Third Canadian Edition—has helped several generations of students understand what statistics is all about and how it can be used as a tool in their particular area of application. The secret to the success of *Introduction to Probability and Statistics* is in its ability to blend the old with the new. With each revision we try to build on the strong points of previous editions, while always looking for new ways to motivate, encourage, and interest students using new technological tools.

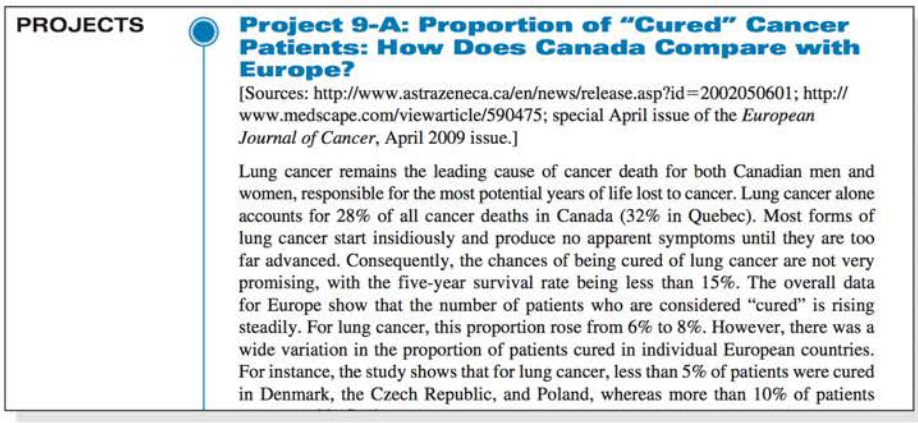
HALLMARK FEATURES OF THE THIRD CANADIAN EDITION

The Third Canadian Edition retains the traditional outline for the coverage of descriptive and inferential statistics. This revision maintains the straightforward presentation of the previous edition. In this spirit, the Third Canadian Edition continues to simplify and clarify the language and to make the language and style more readable and "user friendly"—without sacrificing the statistical integrity of the presentation. Great effort has been taken to "train your brain" to explain not only how to apply statistical procedures, but also to explain:

- how to meaningfully describe real sets of data
- what the results of statistical tests mean in terms of their practical applications
- how to evaluate the validity of the assumptions behind statistical tests
- what to do when statistical assumptions have been violated

Exercises

In the tradition of the previous Canadian edition, the variety and number of real applications in the exercise sets is a major strength of this edition. Within the Third Canadian Edition are "big picture" projects, or mini cases, added throughout the text.



PROJECTS

Project 9-A: Proportion of "Cured" Cancer Patients: How Does Canada Compare with Europe?

[Sources: http://www.astrazeneca.ca/en/news/release.asp?id=2002050601; http://www.medscape.com/viewarticle/590475; special April issue of the *European Journal of Cancer*, April 2009 issue.]

Lung cancer remains the leading cause of cancer death for both Canadian men and women, responsible for the most potential years of life lost to cancer. Lung cancer alone accounts for 28% of all cancer deaths in Canada (32% in Quebec). Most forms of lung cancer start insidiously and produce no apparent symptoms until they are too far advanced. Consequently, the chances of being cured of lung cancer are not very promising, with the five-year survival rate being less than 15%. The overall data for Europe show that the number of patients who are considered "cured" is rising steadily. For lung cancer, this proportion rose from 6% to 8%. However, there was a wide variation in the proportion of patients cured in individual European countries. For instance, the study shows that for lung cancer, less than 5% of patients were cured in Denmark, the Czech Republic, and Poland, whereas more than 10% of patients

These provide an opportunity for students to build on knowledge gained from previous chapters and apply it to big picture projects. Rather than working with problems based only on the individual sections, students will be using almost all of the concepts, definitions, and techniques given in that chapter, thus bolstering students' success rate. We have also added more examples and exercises to selected chapters and a number of new and updated real data sets from applications in many interesting fields. The Third Canadian Edition contains over 1300 problems, with almost 200 that are Canadian. Exercises are graduated in level of difficulty; some, involving only basic techniques, can be solved by almost all students, while others, involving practical applications and interpretation of results, will challenge students to use more sophisticated statistical reasoning and understanding.

Organization and Coverage

Chapters 1 to 3 present descriptive data analysis for both one and two variables, using both *MINITAB* and *Microsoft Excel*. We believe that Chapters 1 through 10—with the possible exception of Chapter 3—should be covered in the order presented. The remaining chapters can be covered in any order. The analysis of variance chapter precedes the regression chapter, so that the instructor can present the analysis of variance as part of a regression analysis. Thus, the most effective presentation would order these three chapters as well.

Chapter 4 includes a full presentation of probability and probability distributions. Three optional sections—Counting Rules, the Total Law of Probability, and Bayes' Rule—are placed into the general flow of text, and instructors will have the option of complete or partial coverage. The sections that present event relations, independence, conditional probability, and the Multiplication Rule have been rewritten in an attempt to clarify concepts that often are difficult for students to grasp. Responding to the needs of Canadian students, we have added a new section, Exponential Distribution, to Chapter 6. The memoryless property of the exponential distribution is also discussed. Further, some discussions on Bayesian and Frequentist perspectives in statistics are included in the current edition.

The section on Bayes' rule has been expanded by adding new examples based on new real Canadian data sets. The chapters on analysis of variance and linear regression include both calculational formulas and computer printouts in the basic text presentation. These chapters can be used with equal ease by instructors who wish to use the "hands-on" computational approach to linear regression and ANOVA and by those who choose to focus on the interpretation of computer-generated statistical printouts.

With the advent of computer-generated *p*-values, the emphasis on *p*-values and their use in judging statistical significance have become essential components in reporting the results of a statistical analysis. As such, the observed value of the test statistic and its *p*-value are presented together at the outset of our discussion of statistical hypothesis testing as equivalent tools for decision making. Statistical significance is defined in terms of preassigned values of α, and the *p-value approach* is presented as an alternative to the *critical value approach* for testing a statistical hypothesis. Examples are presented using both the *p-value* and *critical value* approaches to hypothesis testing. Discussion of the practical interpretation of statistical results, along with the difference between statistical significance and practical significance, is emphasized in the practical examples in the text.

Finally, the third Canadian edition has attempted to address inconsistencies in the use of notation for random variables. In this edition, "X" is employed to denote a random variable and "x" or "k" to denote an observed value. The classical approach is retained for the notation of regression.

Special Features of the Third Canadian Edition

- **NEED TO KNOW…:** A special feature of this edition are highlighted sections called "NEED TO KNOW…" and identified by this icon: NEED TO KNOW These sections provide information consisting of definitions, procedures or step-by-step hints on problem solving for specific questions such as "NEED TO KNOW… How to Construct a Relative Frequency Histogram" or "NEED TO KNOW… How to Decide Which Test to Use"
- **Applets:** Easy access to the Internet has made it possible for students to visualize statistical concepts using an interactive webtool called an applet. Applets written by Gary McClelland, author of *Seeing Statistics*™, are found on the website for the third Canadian edition (www.probandstats3e.nelson.com). Following each applet, appropriate exercises are available that provide visual reinforcement of the concepts presented in the text. Applets allow the user to perform a statistical experiment, to interact with a statistical graph, to change its form, or to access an interactive "statistical table."

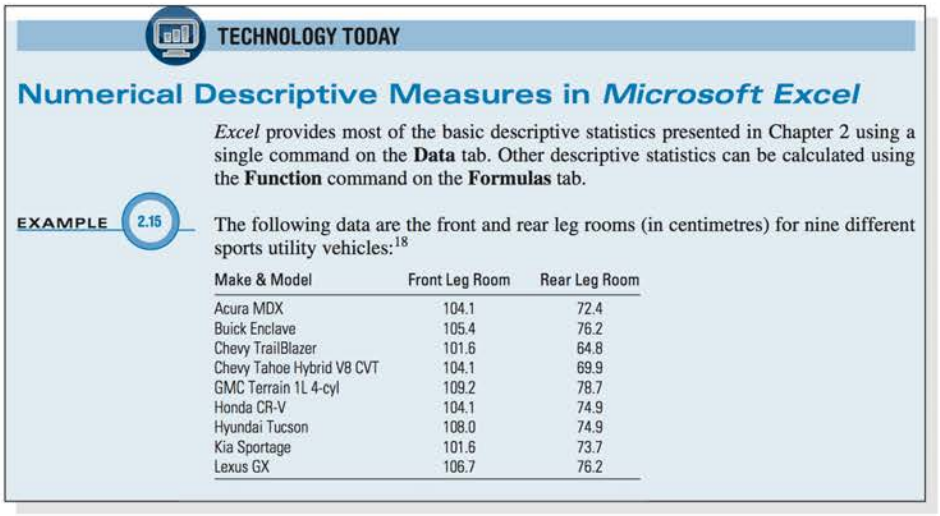
The Role of Computers in the Third Canadian Edition—Technology Today

Computers are now a common tool for college students in all disciplines. Most students are accomplished users of word processors, spreadsheets, and databases, and they have no trouble navigating through software packages in the Windows environment. We believe, however, that advances in computer technology should not turn statistical analyses into a "black box." Rather, we choose to use the computational shortcuts and interactive visual tools that modern technology provides to give us more time to emphasize statistical reasoning as well as the understanding and interpretation of statistical results.

In this edition, students will be able to use computers for both standard statistical analyses and as a tool for reinforcing and visualizing statistical concepts. Both

Microsoft Excel and *MINITAB* 16 (consistent with earlier versions of *MINITAB*) are used exclusively as the computer packages for statistical analysis. However, we have chosen to isolate the instructions for generating computer output into individual sections called Technology Today at the end of each chapter. Each discussion uses numerical examples to guide the student through the *Microsoft Excel* commands and options necessary for the procedures presented in that chapter, and then present the equivalent steps and commands needed to produce the same or similar results using *MINITAB*. We have included screen captures from both *Microsoft Excel* and *MINITAB* 16, so that the student can actually work through these sections as "mini-labs."

If you do not need "hands-on" knowledge of *MINITAB* or *Microsoft Excel*, or if you are using another software package, you may choose to skip these sections and simply use the printouts as guides for the basic understanding of computer printouts.



TECHNOLOGY TODAY

Numerical Descriptive Measures in *Microsoft Excel*

Excel provides most of the basic descriptive statistics presented in Chapter 2 using a single command on the **Data** tab. Other descriptive statistics can be calculated using the **Function** command on the **Formulas** tab.

EXAMPLE 2.15

The following data are the front and rear leg rooms (in centimetres) for nine different sports utility vehicles:[18]

Make & Model	Front Leg Room	Rear Leg Room
Acura MDX	104.1	72.4
Buick Enclave	105.4	76.2
Chevy TrailBlazer	101.6	64.8
Chevy Tahoe Hybrid V8 CVT	104.1	69.9
GMC Terrain 1L 4-cyl	109.2	78.7
Honda CR-V	104.1	74.9
Hyundai Tucson	108.0	74.9
Kia Sportage	101.6	73.7
Lexus GX	106.7	76.2

Numerical Descriptive Measures in *MINITAB*

MINITAB provides most of the basic descriptive statistics presented in Chapter 2 using a single command in the drop-down menus.

EXAMPLE 2.16

The following data are the front and rear leg rooms (in centimetres) for nine different sports utility vehicles:[19]

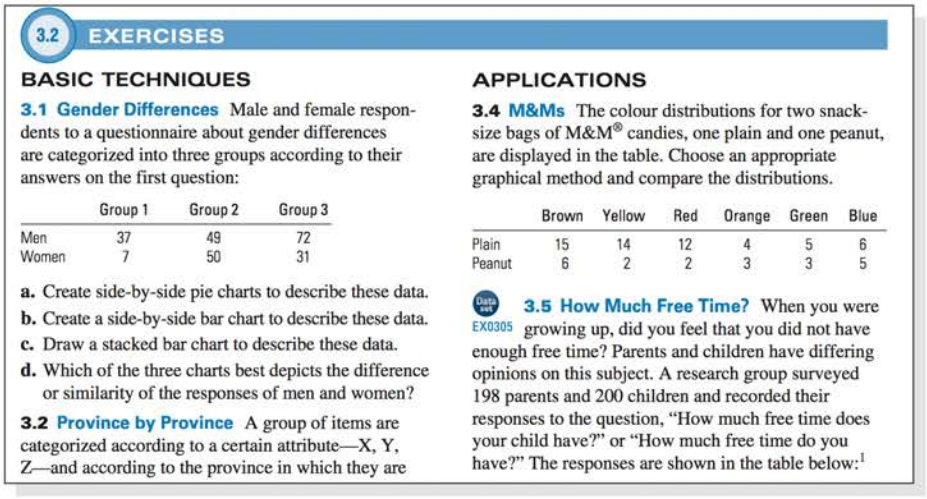
Make & Model	Front Leg Room	Rear Leg Room
Acura MDX	104.1	72.4
Buick Enclave	105.4	76.2
Chevy TrailBlazer	101.6	64.8
Chevy Tahoe Hybrid V8 CVT	104.1	69.9
GMC Terrain 1L 4-cyl	109.2	78.7
Honda CR-V	104.1	74.9
Hyundai Tucson	108.0	74.9
Kia Sportage	101.6	73.7
Lexus GX	106.7	76.2

Any student who has Internet access can use the applets found on the website for the third Canadian edition (www.probandstats3e.nelson.com) to visualize a variety of statistical concepts. In addition, some of the applets can be used instead of computer software to perform simple statistical analyses. Exercises written specifically for use with these applets also appear on the text website. Students can use the applets at home

or in a computer lab. They can use them as they read through the text material, once they have finished reading the entire chapter, or as a tool for exam review. Instructors can use the applets as a tool in a lab setting, or use them for visual demonstrations during lectures. We believe that these applets will be a powerful tool that will increase student enthusiasm for, and understanding of, statistical concepts and procedures.

STUDY AIDS

The many and varied exercises in the text provide the best learning tool for students embarking on a first course in statistics. The answers to all odd-numbered exercises are given in the back of the text, and a detailed solution appears in the *Student Solutions Manual*, which is available as a supplement for students. Each application exercise has a title, making it easier for students and instructors to immediately identify both the context of the problem and the area of application.



3.2 EXERCISES

BASIC TECHNIQUES

3.1 Gender Differences Male and female respondents to a questionnaire about gender differences are categorized into three groups according to their answers on the first question:

	Group 1	Group 2	Group 3
Men	37	49	72
Women	7	50	31

a. Create side-by-side pie charts to describe these data.
b. Create a side-by-side bar chart to describe these data.
c. Draw a stacked bar chart to describe these data.
d. Which of the three charts best depicts the difference or similarity of the responses of men and women?

3.2 Province by Province A group of items are categorized according to a certain attribute—X, Y, Z—and according to the province in which they are

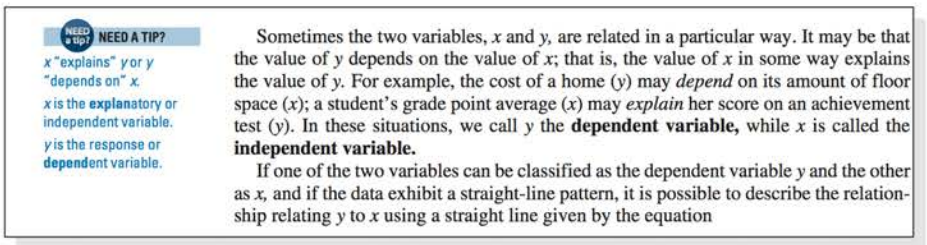
APPLICATIONS

3.4 M&Ms The colour distributions for two snack-size bags of M&M® candies, one plain and one peanut, are displayed in the table. Choose an appropriate graphical method and compare the distributions.

	Brown	Yellow	Red	Orange	Green	Blue
Plain	15	14	12	4	5	6
Peanut	6	2	2	3	3	5

Data set EX0305 **3.5 How Much Free Time?** When you were growing up, did you feel that you did not have enough free time? Parents and children have differing opinions on this subject. A research group surveyed 198 parents and 200 children and recorded their responses to the question, "How much free time does your child have?" or "How much free time do you have?" The responses are shown in the table below:[1]

Students should be encouraged to use the "**NEED TO KNOW**…" sections as they occur in the text. The placement of these sections is intended to answer questions as they would normally arise in discussions. In addition, there are numerous hints called "**NEED A TIP?**" that appear in the margins of the text. The tips are short and concise.



NEED a tip? NEED A TIP?

x "explains" *y* or *y* "depends on" *x*.

x is the **explan**atory or independent variable.

y is the response or **depend**ent variable.

Sometimes the two variables, x and y, are related in a particular way. It may be that the value of y depends on the value of x; that is, the value of x in some way explains the value of y. For example, the cost of a home (y) may *depend* on its amount of floor space (x); a student's grade point average (x) may *explain* her score on an achievement test (y). In these situations, we call y the **dependent variable,** while x is called the **independent variable.**

If one of the two variables can be classified as the dependent variable y and the other as x, and if the data exhibit a straight-line pattern, it is possible to describe the relationship relating y to x using a straight line given by the equation

Finally, sections called **Key Concepts and Formulas** appear in each chapter as a review in outline form of the material covered in that chapter.

CHAPTER REVIEW

Key Concepts and Formulas

I. Measures of the Centre of a Data Distribution

1. Arithmetic mean (mean) or average
   a. Population: μ
   b. Sample of n measurements: $\bar{x} = \dfrac{\sum x_i}{n}$
2. Median; **position** of the median $= 0.5(n + 1)$
3. Mode
4. The median may be preferred to the mean if the data are highly skewed.

II. Measures of Variability

1. Range: R = largest − smallest
2. Variance
   a. Population of N measurements:

III. Tchebysheff's Theorem and the Empirical Rule

1. Use Tchebysheff's Theorem for any data set, regardless of its shape or size.
   a. At least $1 - (1/k^2)$ of the measurements lie within k standard deviations of the mean.
   b. This is only a lower bound; there may be more measurements in the interval.
2. The Empirical Rule can be used only for relatively mound-shaped data sets. Approximately 68%, 95%, and 99.7% of the measurements are within one, two, and three standard deviations of the mean, respectively.

IV. Measures of Relative Standing

The text website for the Third Canadian Edition of *An Introduction to Probability and Statistics* (www.probandstats3e.nelson.com) provides students with data sets for many of the text exercises saved in a variety of formats, and the complete set of My Applet sections from the text. A complete set of Java Applets is available on the text website.

INSTRUCTOR RESOURCES

The **Nelson Education Teaching Advantage (NETA)** program delivers research-based instructor resources that promote student engagement and higher-order thinking to enable the success of Canadian students and educators.

Instructors today face many challenges. Resources are limited, time is scarce, and a new kind of student has emerged: one who is juggling school with work, has gaps in his or her basic knowledge, and is immersed in technology in a way that has led to a completely new style of learning. In response, Nelson Education has gathered a group of dedicated instructors to advise us on the creation of richer and more flexible ancillaries and online learning platforms that respond to the needs of today's teaching environments. Whether your course is offered in-class, online, or both, Nelson is pleased to provide pedagogically-driven, research-based resources to support you.

The members of our editorial advisory board have experience across a variety of disciplines and are recognized for their commitment to teaching. They include:

Norman Althouse, Haskayne School of Business, *University of Calgary*
Brenda Chant-Smith, Department of Psychology, *Trent University*
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Roger Fisher, PhD

In consultation with the editorial advisory board, Nelson Education has completely rethought the structure, approaches, and formats of our key textbook ancillaries and online learning platforms. We've also increased our investment in editorial support for our ancillary and digital authors. The result is the Nelson Education Teaching Advantage and its key components: *NETA Engagement, NETA Assessment, NETA Presentation,* and *NETA Digital*. Each component includes one or more ancillaries prepared according to our best practices and may also be accompanied by documentation explaining the theory behind the practices.

NETA Engagement presents materials that help instructors deliver engaging content and activities to their classes. Instead of Instructor's Manuals that regurgitate chapter outlines and key terms from the text, NETA Enriched Instructor's Manuals (EIMs) provide genuine assistance to teachers. The EIMs answer questions like *What should students learn?, Why should students care?,* and *What are some common student misconceptions and stumbling blocks?* EIMs not only identify the topics that cause students the most difficulty, but also describe techniques and resources to help students master these concepts. Dr. Roger Fisher's *Instructor's Guide to Classroom Engagement (IGCE)* accompanies every Enriched Instructor's Manual. (Information about the NETA Enriched Instructor's Manual prepared for *Introduction to Probability and Statistics,* Third Canadian Edition, is included in the description of the IRCD below.)

NETA Assessment relates to testing materials. Under *NETA Assessment*, Nelson's authors create multiple-choice questions that reflect research-based best practices for constructing effective questions and testing not just recall but also higher-order thinking. Our guidelines were developed by David DiBattista, a 3M National Teaching Fellow whose recent research as a professor of psychology at Brock University has focused on multiple-choice testing. All Test Bank authors receive training at workshops conducted by Prof. DiBattista, as do the copyeditors assigned to each Test Bank. A copy of *Multiple Choice Tests: Getting Beyond Remembering*, Prof. DiBattista's guide to writing effective tests, is included with every Nelson Test Bank/Computerized Test Bank package. (Information about the NETA Test Bank prepared for *Introduction to Probability and Statistics*, Third Canadian Edition is included in the description of the IRCD below.)

NETA Presentation has been developed to help instructors make the best use of PowerPoint® in their classrooms. With a clean and uncluttered design developed by Maureen Stone of StoneSoup Consulting, NETA Presentation features slides with improved readability, more multi-media and graphic materials, activities to use in class, and tips for instructors on the Notes page. A copy of *NETA Guidelines for Classroom Presentations* by Maureen Stone is included with each set of PowerPoint slides. (Information about the NETA PowerPoint® prepared for *Introduction to Probability and Statistics*, Third Canadian Edition is included in the description of the IRCD below.)

NETA Digital is a framework based on Arthur Chickering and Zelda Gamson's seminal work "Seven Principles of Good Practice In Undergraduate Education" (AAHE Bulletin, 1987) and the follow-up work by Chickering and Stephen C. Ehrmann, "Implementing the Seven Principles: Technology as Lever"(AAHE Bulletin, 1996). This aspect of the NETA program guides the writing and development of our digital