ERRATA

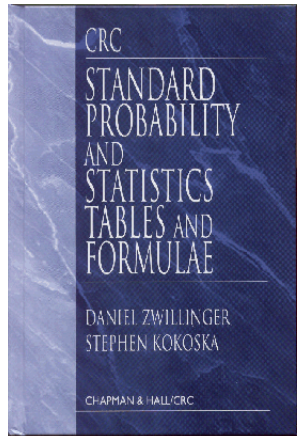
Standard Probability and Statistics
Tables and Formulae

by

Daniel Zwillinger

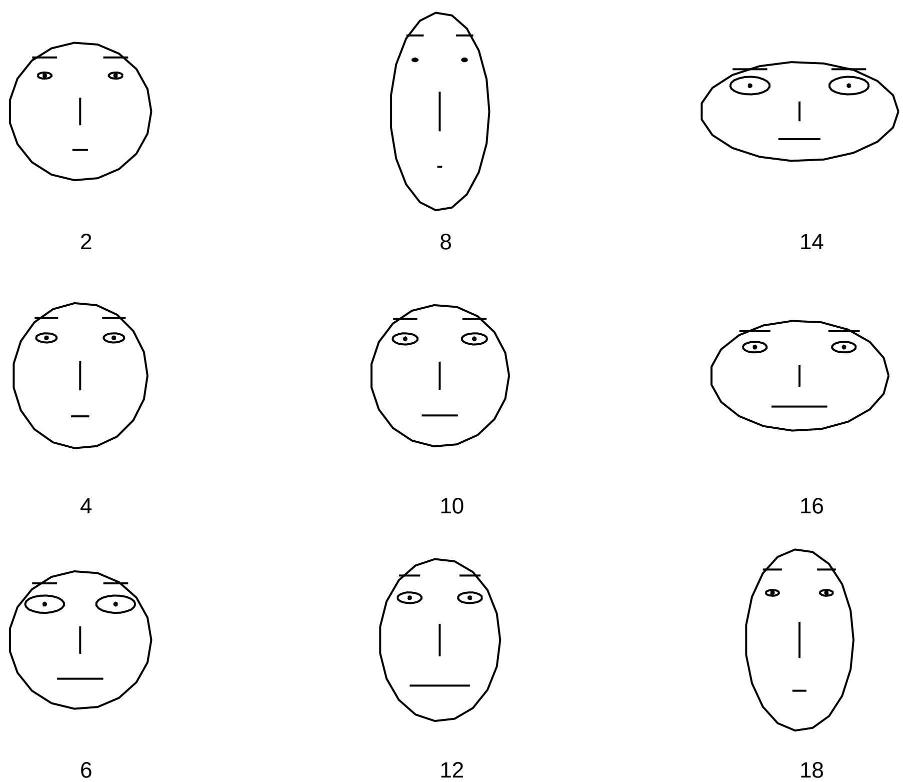
and

Stephen Kokoska



If you find errata, please email us at skokoska@bloomu.edu.

1. Section 2.1.5, Chernoff faces, page 8:
   The description of the data and the figures do not agree. The correct Chernoff faces corresponding to the data are given below.



2. Section 3.1, ALGEBRA OF SETS, page 23, Figures 3.1-3.4:
The shading in the figures is not clear. The correct figures are given below.

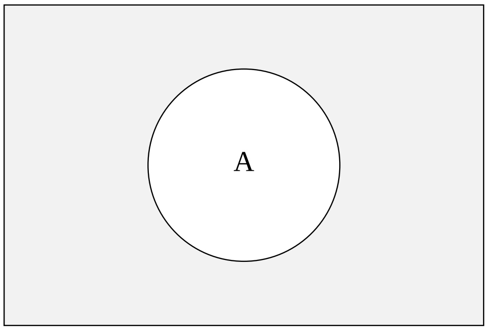


Figure 3.1: Shaded region = A'.

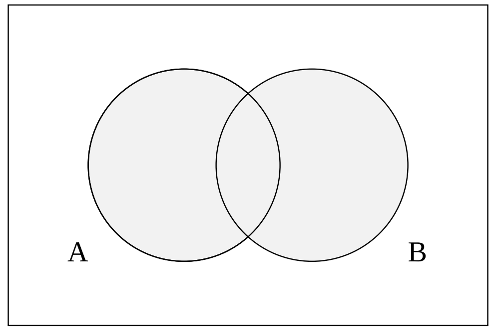


Figure 3.2: Shaded region = $A \cup B$.

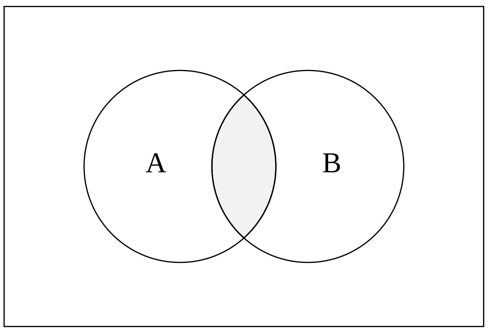


Figure 3.3: Shaded region = $A \cap B$.

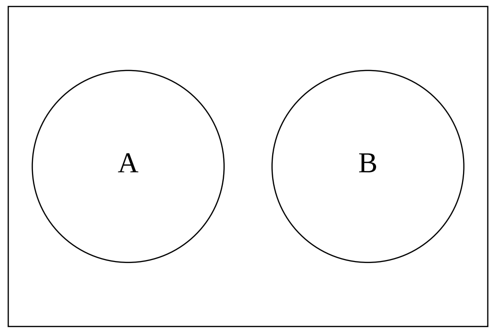


Figure 3.4: Mutually exclusive sets.

3. Section 4.6.6, Midrange and range, page 63:
In the first two sentences, the close parentheses do not match the open parentheses in $X_{(n)}$. The right parentheses is too large.

4. Section 6.6.2, Probability density function, page 127:
The graph labels $\lambda = .5$ and $\lambda = 2$ are reversed.
For $\lambda = 2$ the pdf passes through the point $(0, 2)$.
For $\lambda = .5$ the pdf passes through the point $(0, 5)$.

5. Section 6.9.3, Related Distributions, page 139:
Let $X_1, X_2, \ldots, X_n$ be independent gamma random variables with parameters α_i and β for $i = 1, 2, \ldots, n$. The random variable $Y = X_1 + X_2 + \cdots + X_n$ has a gamma distribution with parameters $\alpha = \alpha_1 + \alpha_2 + \cdots + \alpha_n$ and β.

6. Section 6.15.3, Noncentral Chi-Square distribution, page 146:
Let $X_1, X_2, \ldots, X_\nu$ be independent normal random variables with the same variance, $X_i \sim \mathrm{N}(\mu_i, \sigma^2)$. The sum $\displaystyle\sum_{i=1}^{\nu} \frac{X_i^2}{\sigma^2}$ has a noncentral chi-square distribution with $\lambda = \displaystyle\sum_{i=1}^{\nu} \mu_i^2$.

7. Section 6.27, RELATIONSHIPS AMONG DISTRIBUTIONS, page 161, line 1:
“Figure 6.27 presents ...” should be “Figure 6.28 presents ...”

8. Section 8.9, Estimators for Mean and Standard Deviation in Small Samples, page 193:
   The heading on the second table has a bold "w".
   It should be a bold italic "w".
   It should read:
   Estimating standard deviation σ from the sample range $\boldsymbol{w}$.

9. Section 9.2, Common Critical Values, page 196:
   The last line has "... page 6.4.4, ..."
   It should say "... page 120, ..."

10. Section 10.1, error probabilities (2), page 228:
    The last sentence: The **power** of the hypothesis test is $1 - \alpha$.
    It should read: The **power** of the hypothesis test is $1 - \beta$.

11. Section 10.8, page 241:
    The first sentence: "... with variance $sigma_1^2$."
    It should say: "... with variance σ_1^2."

12. Notation, page 262:
    The formula for S_{xy} contains an errant power of 2.
    It should be:
    $S_{xy} = \sum_{i=1}^{n}(x_i - \overline{x})(y_i - \overline{y}) = \sum_{i=1}^{n} x_i y_i - \frac{1}{n}\left(\sum_{i=1}^{n} x_i\right)\left(\sum_{i=1}^{n} y_i\right)$.

13. Section 11.1.2, Sum of squares, page 263:
    SSR = sum of squares due to regression = $\hat{\beta}_1 S_{xy}$.

14. Section 17.3, Kalman Filtering, page 431:
    Note 3 contains "//" which is erroneous.

15. Section 17.5.4, Stationary distributions, page 437:
    The two step transition matrix should have a last line of
    3/16 3/4 1/16.
    The steady-state distribution is correct.

16. Section 17.10.1.1, Vibonacci numbers, page 449:
    The vibonacci numbers defined by $v_n = v_{n-1} \pm v_{n-1}$ should be
    The vibonacci numbers defined by $v_n = v_{n-1} \pm v_{n-2}$.

17. Section 17.15.4, Stochastic integration, Equation 17.90, page 463:
    The equation has a small "w" that should be a capital "W".
    The correct equation is:

$$
{}_S\int_{t_0}^{t} G(W(s),x)\,dW(s)
$$

$$
= \operatorname*{ms\text{-}lim}_{n\to\infty} \left\{ \sum_{i=1}^{n} G\left(t_{i-1}, W\left(\frac{t_i+t_{i-1}}{2}\right)\right) [W(t_i) - W(t_{i-1})] \right\}.
$$

18. Section 17.16.7, Buffon's needle problem, page 468:
    A needle of length L is placed at random on a plane with ruled parallel lines a distance D apart. If $\frac{L}{D} < 1$ then only one intersection is possible. The probability P that the needle intersects a line is

$$
P = \begin{cases} \dfrac{2L}{\pi D} & \text{if } 0 < L \leq D \\[2ex] \dfrac{2L}{\pi D}\left(1 - \sqrt{1 - \left(\dfrac{D}{L}\right)^2}\right) + \left(1 - \dfrac{2}{\pi}\arcsin\dfrac{D}{L}\right) & \text{if } 0 < D \leq L \end{cases}
$$

19. Section 17.16.8.2, Card games, page 469:
    "distinct 13-card poker hands" should be "distinct 5-card poker hands."

20. Section 17.16.13, Envelope problem "paradox", page 473:
    The end of the quote, "sometime" should be "something."

21. Section 17.16.14, Gambler';s ruin problem, page 473:
    As presently written:

    17.16.14 Gambler's ruin problem

    A gambler starts with z dollars. For each gamble: with probability p she wins one dollar, with probability q she loses one dollar. Gambling stops when she has either zero dollars, or a dollars.

    If q_z denotes the probability of eventually stopping at $z = a$ ("gambler's success") then

$$
q_z = \begin{cases} \dfrac{(q/p)^a - (q/p)^z}{(q/p)^a - 1} & \text{if } p \neq q \\[2ex] 1 - \dfrac{z}{a} & \text{if } p = q = \frac{1}{2} \end{cases} \tag{17.1}
$$

    For example:

	p	q	z	a	q_z
fair	0.5	0.5	9	10	.900
game	0.5	0.5	90	100	.900
	0.5	0.5	900	1000	.900
	0.5	0.5	9000	10000	.900
biased	0.4	0.6	90	100	.017
game	0.4	0.6	90	99	.667

Corrected version:

17.16.14 Gambler's ruin problem

A gambler starts with z dollars. For each gamble: with probability p she wins one dollar, with probability q she loses one dollar (with $p + q = 1$). Gambling stops when she has either zero dollars, or a dollars.

If q_z denotes the probability of eventually stopping at 0 dollars ("gambler's ruin") and p_z denotes the probability of eventually stopping at a dollars ("gambler's success") then $p_z + q_z = 1$ and $q_0 = 1$ and $q_a = 0$ so that:

$$q_z = \begin{cases} \dfrac{(q/p)^a - (q/p)^z}{(q/p)^a - 1} & \text{if } p \neq q \\ \\ 1 - \dfrac{z}{a} & \text{if } p = q = \frac{1}{2} \end{cases} \tag{17.2}$$

For example:

	p	q	z	a	q_z	p_z
fair	0.5	0.5	9	10	.100	.900
games	0.5	0.5	90	100	.100	.900
	0.5	0.5	900	1000	.100	.900
	0.5	0.5	9000	10000	.100	.900
biased	0.495	0.505	90	100	.210	.790
games	0.49	0.51	90	100	.336	.664
	0.45	0.55	90	100	.866	.134
	0.4	0.6	90	100	.983	.017
	0.4	0.6	27	30	.704	.296
	0.4	0.6	18	20	.556	.444
	0.4	0.6	9	10	.339	.661