Corrections to the 4th edition of Economists' Mathematical Manual

An unfortunate technical error caused a number of equals signs to disappear. The formulas affected are listed below, together with a few other misprints.

1.8	$A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$	(There was an extra parenthesis on the far left.)
2.42		See (8.23), not (8.22).
4.5		See (12.14), not (12.12).
4.38		See (4.5), not (4.12).
6.16	Suppose the transformation $\mathbf{f}$ in (6.15) is C^1 in a neighborhood of $\mathbf{x}^0$ and that the Jacobian determinant in (6.13) is not zero at $\mathbf{x}^0$. Then there exists a C^1 transformation $\mathbf{g}$ that is locally an inverse of $\mathbf{f}$, i.e. $\mathbf{g}(\mathbf{f}(\mathbf{x})) = \mathbf{x}$ for all $\mathbf{x}$ in a neighborhood of $\mathbf{x}^0$ and $\mathbf{f}(\mathbf{g}(\mathbf{y})) = \mathbf{y}$ for all $\mathbf{y}$ in a neighborhood of $\mathbf{y}^0 = \mathbf{f}(\mathbf{x}^0)$.	The existence of a *local inverse*. (*Inverse function theorem.* Local version.)
6.24	S must be nonempty.	
6.28		See (12.27), not (12.25).
8.1	$\displaystyle\sum_{i=0}^{n-1}(a+id) = na + \frac{n(n-1)d}{2}$	Sum of the first n terms of an *arithmetic series.*
8.3	$a + ak + \cdots + ak^{n-1} + \cdots = \dfrac{a}{1-k}$ if $\lvert k\rvert < 1$	Sum of an infinite geometric series.
8.31	$\dbinom{n}{k} = \dfrac{n!}{k!(n-k)!} \qquad (0 \le k \le n)$	($k!$, not $n!$, in the denominator.)
8.32	$\dbinom{r}{m}\dbinom{m}{k} = \dbinom{r}{k}\dbinom{r-k}{m-k}$	m and k are integers.
8.33	$\displaystyle\sum_{k=0}^{n}\binom{r}{k}\binom{s}{n-k} = \binom{r+s}{n}$	n is a nonnegative integer.
8.38	$\displaystyle\sum_{k=0}^{n}\binom{n}{k}k = n2^{n-1} \qquad (n \ge 0)$	

8.39	$\sum_{k=0}^{n} \binom{n}{k} k^2 = (n^2+n)2^{n-2} \qquad (n \geq 0)$	
8.44	$1^2 + 2^2 + 3^2 + \cdots + n^2 = \dfrac{n(n+1)(2n+1)}{6}$	
8.45	$1^3 + 2^3 + 3^3 + \cdots + n^3 = \left(\dfrac{n(n+1)}{2}\right)^2$	
8.48	$\lim_{n\to\infty} \left[\left(\frac{1}{1} + \frac{1}{2} + \cdots + \frac{1}{n}\right) - \ln n\right] = \gamma \approx 0.5772\ldots$	The constant γ is called *Euler's constant*.
10.8	For $\frac{1}{4}a^2 - b < 0:\ x_t = Ar^t \cos(\theta t + \omega)$, where …	(The equals sign was missing.)
10.12	$\theta_r = \dfrac{\lambda_r}{\prod\limits_{\substack{1\leq s\leq n \\ s\neq r}} (\lambda_r - \lambda_s)}, \quad r = 1, 2, \ldots, n$	(The equals sign was missing.)
10.20	$x_t + a_1 x_{t-1} + a_2 x_{t-2} + a_3 x_{t-3} + a_4 x_{t-4} = b_t$	(The equals sign was missing.)
10.33	… $x_{t+k} \neq x_t$ for $k = 1, \ldots, n-1$.	($n-1$, not n.)
12.6		… in $\mathbb{R}^n$. If the sequence does not converge, …
12.27	$F(x)$ need not be nonempty.	
14.10	… such that $(*)$ holds for all $\mathbf{x}$ in $S \cap B(\mathbf{x}^*; r)$.	
14.38	X must be compact and nonempty.	(Otherwise there will be no maximum point.)
18.28	(c) $\alpha\langle x, y\rangle = \langle \alpha x, y\rangle = \langle x, \alpha y\rangle$	(=, not +.)
19.8	If $\mathbf{A} = (a_{ij})_{m\times n}$ and $\mathbf{B} = (b_{jk})_{n\times p}$, we define the *product* $\mathbf{C} = \mathbf{AB}$ as the $m \times p$ matrix $\mathbf{C} = (c_{ik})_{m\times p}$ where $c_{ik} = a_{i1}b_{1k} + \cdots + a_{ij}b_{jk} + \cdots + a_{in}b_{nk}$	The definition of *matrix multiplication*. (Now the subscripts agree with those in the displayed matrices.)

28.25 If $f(0) = 0$, $\lambda/s < f'(0) < \infty$, $f'(k) \to 0$ as $k \to \infty$, and $f''(k) \leq 0$ for all $k \geq 0$, then the equation in (28.24) has a unique solution on $[0, \infty)$ for every positive initial value $k(0)$ of k. The equation has a unique positive equilibrium state k^*, defined by $sf(k^*) = \lambda k^*$. This equilibrium is asymptotically stable on $(0, \infty)$. (See the figure below.)

Existence and uniqueness of solutions of Solow's growth model over $[0, \infty)$. (See Example 5.8.8 in Sydsæter et al. (2005).) The existence of k^* follows immediately from the conditions on f.

28.26 (The figure shows the phase diagram for the equation in (28.24) under the conditions in (28.25), not (26.25).)

33.7 $$P(A_i \mid B) = \frac{P(B \mid A_i) \cdot P(A_i)}{\sum\limits_{j=1}^{n} P(B \mid A_j) \cdot P(A_j)}$$

(The equals sign was missing.)

33.8 Here and in (33.10) and (33.11), X is a random variable with probability density function f.

33.24
- $P((X,Y) \in A) = \sum\limits_{(x,y) \in A} f(x,y)$
- $P((X,Y) \in A) = \iint\limits_{A} f(x,y)\, dx\, dy$

$f(x,y)$ is the two-dimensional discrete/continuous *simultaneous density function* for the random variables X and Y.

33.30 $E[XY] = E[X]\,E[Y]$ if X and Y are uncorrelated.

Follows from (33.28) and (33.29).

33.35 $$\operatorname{var}\Big[\sum_{i=1}^{n} a_i X_i\Big] = \sum_{i=1}^{n} \sum_{j=1}^{n} a_i a_j \operatorname{cov}[X_i, X_j] = \cdots$$

(The first equals sign was missing.)

33.36 $$\operatorname{var}\Big[\sum_{i=1}^{n} a_i X_i\Big] = \sum_{i=1}^{n} a_i^2 \operatorname{var}[X_i]$$

Formula (33.35) when $X_1, \ldots, X_n$ are pairwise uncorrelated.

33.37 $$\operatorname{corr}[X,Y] = \frac{\operatorname{cov}[X,Y]}{\sqrt{\operatorname{var}[X]\operatorname{var}[Y]}} \in [-1, 1]$$

(The equals sign was missing.)

33.39 $$f(x \mid y) = \frac{f(x,y)}{f_Y(y)}, \quad f(y \mid x) = \frac{f(x,y)}{f_X(x)}$$

Definitions of *conditional densities*.

33.41	• $E[X \mid y] = \sum_x x f(x \mid y)$ • $E[X \mid y] = \int_{-\infty}^{\infty} x f(x \mid y)\, dx$ • $\operatorname{var}[X \mid y] = \sum_x \big(x - E[X \mid y]\big)^2 f(x \mid y)$ • $\operatorname{var}[X \mid y] = \int_{-\infty}^{\infty} (x - E[X \mid y])^2 f(x \mid y)\, dx$	(Three equals signs were missing.)
33.48	$\mathrm{MSE}(\hat\theta) = E[\hat\theta - \theta]^2 = \operatorname{var}[\hat\theta] + b^2$	(The first equals sign was missing.)
33.51	If g is continuous, then $\operatorname{plim} g(\theta_T) = g(\operatorname{plim} \theta_T)$	Slutsky's theorem.
35.2	The correct equation of the line is $y = a + bx$ and the deviations are then $e_i = y_i - (a + bx_i)$.	

References (for Chapter 32):

Charalambides, not Charalambos.

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