

**ERRATA IN EDWARD BELTRAMI, *MATHEMATICAL MODELS
FOR SOCIETY AND BIOLOGY***

- 3, 7:** Clearer: "... $p_{i,j}$ denotes the observed fraction, out of all the moves from state i , of those that go to state j ."
- 4, -1:** Remove \square .
- 5, 4:** Add \square at the end of the line.
- 5, 17:** "Transient" is defined in the next paragraph.
- 6, 16:** (Proof of Lemma 1.2) "With probability one, each transient state will be visited only a finite number of times, as we..."
- 6, 21:** (Theorem 1.1) This \mathbf{I} is $N - s$ by $N - s$.
- 6, -12:** Remove \square .
- 6, -7:** Add \square at the end of the line.
- 10, 3:** "... and $(\mathbf{I} - \mathbf{Q})^{-1}$..."
- 11, 8:** (Formula 1.7) $M_i = b_{i,1} + \sum_{j=3}^7 t_{i,j} - 1$
- 11, 9:** "(Exercise 1.5.4...)"
- 12, bottom:** Figure 1.3 is missing numerical labels. 1 is "No more crime," 2 is "Commit a crime," 3 is "Get arrested," and 4 is "Convicted and incarcerated."
- 15, 4:** Should be $h_{i,i}$, not $h_{i,1}$.
- 29, -11:** Should be a_i , not a_2 .
- 36, 9:** $x_j = r_j - x_{j+7} - x_{j-1} \leq r_j - x_{j-1}$
- 36, 12:** $x_j \leq r_{j+1}$
- 36, -9:** "Otherwise x_{j+7} is nonzero..."
- 44, 15:** Add \square at the end of the line.
- 46, 2:** Add \square at the end of the line.
- 46, 15:** "... this constitutes m independent ..."
- 46, -5:** "... general hypotheses."
- 47, -14:** $m = n\lambda h = t\lambda \dots$
- 66:** Should give a precise definition of what is meant by "graph," since different people use it to mean different things. Here, we seem to be allowing no edges from a node to itself (otherwise, Theorem 4.3 is not true).
- 67, 11:** "... is called an *Euler tour*..."
- 67, 13:** Theorem 4.1 should read: *A connected directed graph has an Euler tour if and only if the difference between the inner and outer degrees is zero at each node.*
- 67, -12:** "covers all the **edges** we are done..."
- 67, -4:** "... not directed an **Euler tour**..."
- 68, 1:** I'm not sure what "the degree condition of Theorem 4.2.1" is (for one thing, there is no Theorem 4.2.1), but I believe the lemma is true for any graph.
- 71, -8:** "... supply nodes 4, 7, and **14**..."
- 74, -3:** "... Implicit in this **is** that each..."

79, -11: The picture in the plane, described in the first sentence of §5.2, is **not** shown in Figure 5.1.

80, Figure 5.1: The center point should be labeled p , not P .

80, 5: Should be dV , not dR .

81, -6: "...think of C_1 as lying..."

82, figure 5.3: Points should be labeled p and p' , not P and P' .

82, Figure 5.3 caption: "...surface S bounded by one..."

82, 5-7: The situation described here, with two surfaces enclosing a region R , is not really pictured in Figure 5.3.

83, 9: Again, this is not quite what's shown in Figure 5.3.

87, 11: The second "cos" in formula (5.9) should not be in italics.

117, -5: Should read

$$\int \frac{x'(t)}{f(x(t))} dt = t + \text{constant}$$

117, -3: Should be $\int \frac{1}{f(x)} dx$, not $\int f(x) dx$.

124, -10 and -9: "...equation (7.3) has one, two, or three equilibria..."

130, 7: "...the waters **an** impenetrable..."

136, 8: The second derivative is less than or equal to zero, **not** necessarily negative.

136, 9: Should be \leq , not $<$.

136, 11: Should be \leq , not $<$.

165, 6: "U-boat" usually refers to German submarines.