

16 ADJUSTMENT BY LEAST SQUARES

Asterisks (*) indicate problems that have partial answers given in Appendix G.

16.1 What fundamental condition is enforced by the method of unweighted least squares?

From Section 16.2, paragraph 4: “For a group of equally weighted observations, the fundamental condition enforced by the least-squares method is that the sum of the squares of the residuals is a minimum. Suppose a group of m observations of equal weight were taken having residuals v_i . Then, in equation form, the fundamental condition of least squares is

$$\sum_{i=1}^m v_i^2 = v_1^2 + v_2^2 + v_3^2 + \cdots + v_m^2 \rightarrow \text{minimum}”$$

16.2 Why are adjustments performed using the least-squares method generally programmed?

From Section 16.1, paragraph 3: “Although the theory of least squares was developed in the late 1700s, because of the lengthy calculations involved, the method was not used commonly prior to the availability of computers. Instead, arbitrary, or “rule of thumb,” methods such as the compass (Bowditch) rule were applied.”