Kopf's trisection of the angle is improved by B. J. Topel in such a way that the maximum error is reduced from 15″ to 0.5″.

In the concluding paper, Professor Menger advances a number of interesting suggestions on the logic of doubting, commanding, and wishing. In his logic of the doubtful, a proposition must be contained in one of three mutually exclusive classes, according as it is asserted, doubted, or negated. This logic differs from those ordinarily proposed in that the class of a compound proposition is not uniquely determined by the classes of its constituents; two doubtful propositions may be related to each other in a number of ways, according to the classes in which various of their compounds belong. To introduce option into logic, preference is formalized by using a fixed proposition A (for example, "I shall be glad") and regarding p as desirable when p implies A; it is urged that only doubtful propositions are objects of wishes and commands. Perhaps the most suggestive remark made in connection with optative logic —of which several simple cases are treated—is that the relation "M is preferable to (that is, more valuable than) N" furnishes a partial ordering of economic goods in which ordinal incomparability is transitive.

Especially in the first and third papers, there are numerous misprints; except occasionally in the third, none were noticed which seemed likely to confuse an attentive reader.

F. A. FICKEN

Ebene Kinematik. By W. Blaschke. (Hamburger mathematische Einzelschriften, no. 25.) Leipzig, Teubner, 1938. 56 pp.

"Plane Kinematics" is a subject usually regarded as a part of mechanics. It starts with the simple concept of the plane displacement of a rigid body, and leads on through consideration of velocity and acceleration into technical complications of importance to engineers. In the book under review no such treatment is attempted, although the title might lead one to expect it. On the contrary, dependence on time is not included, so that we have to consider only the simplest kinematical concept, namely, the displacement of a rigid body in a plane. The superstructure based on that concept is essentially not that of the engineer (a scant three pages are devoted to linkages) but of the modern geometer in search of a manifold.

Any displacement of a rigid body in a plane may be specified by three parameters (for example, the components of displacement of any point in the body and the angle of rotation). Hence these displacements constitute a manifold or space of three dimensions. It is with the geometry of this three-space that the book is concerned. We must indicate in some detail how the author realizes this three-space.

Let E be the plane in which the displacements take place, and let S be an euclidean three-space containing E. First consider displacements in E other than pure translations. Any such displacement is a rotation about some point A of E through some angle 2ω. Let us take the point B in S on the normal to E at A, at a distance $\cot \omega$ below E. Then B represents the displacement in the sense that B is uniquely defined by, and uniquely defines, the displacement. Actually, the author gives a very simple geometrical construction by which the displacement may be found when B is given, but we shall not describe it here.

Thus the totality of displacements in E (omitting translations) corresponds to the whole of the euclidean space S. Translations correspond to points at infinity of S (with the exception of points at infinity in E), and so the complete representative space for all displacements is a projective three-space P, from which, however, the line at infinity in E is omitted.