(b) Demonstrate that total correspondence provides classical results even in systems demonstrably weaker than classical analysis.

(c) Examine nonclassical theories according to this characterization and show that they successfully approximate classical mathematics to the extent that they maintain such an equilibrium. Use this to account for divergences from classical mathematics.

II. **Partial results.**

(a) We note that a theory has two classes of objects: those that are intended and those that can be constructed within the theory. We call the former class (A^T) the *admissible objects* of the given theory T; and the latter class (C^T) the *constructible objects* of T. For given T, the equilibrium hypothesis is $A^T = C^T$. For formal system we give a precise characterization of A^T and C^T.

(b) We define a family of type theoretic systems from a basic stock of rules and axioms expressing different possible relations between A and C. Partial results indicate that those having $A^T = C^T$, though weaker than Hilbert and Bernays's formalization of classical analysis, allow the missing axioms to be derived in them.

(c) *Conjectures.* Intuitionistic analysis: $C \subsetneq A$. Recursive analysis: $A \subsetneq C$. Bishop's constructive analysis: $A = C$.

P. E. LAUER, *The perils of indirect proof or another efficient search algorithm to find the elementary circuits of directed graphs.*

In a paper entitled *An efficient search algorithm to find the elementary circuits of a graph* (***Communications of the Association for Computing Machinery,*** vol. 13 (1970), p. 12) James C. Tiernan presents a "theoretically most efficient search algorithm ... which uses an exhaustive search to find all the elementary circuits of a (directed) graph," together with proofs of its termination, correctness and efficiency.

A thoroughgoing analysis of Tiernan's algorithm shows that half the storage used by the algorithm is not logically required by the algorithm. Therefore, it seemed surprising that this unnecessary inefficiency was present in the algorithm even though a proof of its efficiency had been given in its presentation. Furthermore, Tiernan's proof of termination is indirect, using reductio ad adsurdum, and as we show his proof utilizes properties of the algorithm which have nothing to do with termination. Since the indirect method of proof is in general much more powerful than a direct proof method, this invites one to "pack" more into one's demonstration than is strictly required for the proof. This of course means that those properties of the algorithm most characteristic of it will not be delineated. Our direct proof is simpler and does give an account of precisely those points in the algorithm which might give rise to nontermination.

The present study is one of a series of studies undertaken by the author in order to obtain a more intuitively satisfying and practically feasible method of presenting and documenting algorithms. Which method or methods will emerge as practically useful and which types of theorems will be most suitable for communicating algorithms should emerge from a similar analysis of important representative algorithms in the literature. If proving properties of programs is not just to remain an academic exercise, then it is not sufficient to prove that an algorithm terminates and is correct, but in addition the proof should make explicit the most important characteristics of the algorithm both from a theoretical and practical point of view.

EDUARD WETTE, *The dependence of Planck's "constant" on the frequency, identical return and predestination as some methodological consequences of consistency in the morphology of a geometro-static diagram for the æther's motion (including the monads' variation).*

The inconsistency of number theory (and Euclidean geometry)—cf. this JOURNAL, vol. 36, pp. 376–377; details in 16 private 150 minute lectures at Bonn 1973—enforces new instructions for geometry, physics, astronomy. The uniqueness of the proportion of shapes and of its change in a natural morphology cannot be described in terms of transformation groups (Felix Klein, 1872), which were fit only for the systematization of conservation properties with respect to a silhouette of the reality in our external and internal world.

Exact solutions of the "perfect" interpolation and extrapolation [2, Problem 5] use an intra-finite calculus $\mathfrak{S}$ on geometro-static concepts [1, Figure 8].

The Cartesian diagram of a harmonic oscillation $\vartheta = \vartheta_0 \cos \omega t$ chooses an "unnatural" distribution of points: $\dot{s} = ds/dt = (1 + \dot{\vartheta}^2)^{1/2}$ yields $\ddot{s} = \dot{\vartheta}\ddot{\vartheta}/\dot{s}$ and $\dddot{s} = -\omega^2 \cdot (\dot{s} - (1 + (\vartheta_0\omega)^2) \cdot \dot{s}^{-3})$. Nevertheless, a quantum of radiation energy is approximately conceivable as an 'impulse' of curvature: $\int \kappa\, dt = \int \ddot{\vartheta}\dot{s}^{-3}\, dt = \dot{\vartheta}/\dot{s}$; each "peak"-impulse between $t = (n/2 \mp 1/4) \cdot (1/\nu)$ has the absolute value $2 \cdot \vartheta_0\omega/(1 + (\vartheta_0\omega)^2)^{1/2}$ [3]: $\simeq 2\vartheta_0 \cdot \omega \leftarrow \omega \ll 1$, $\simeq 2 \leftarrow \omega > 1$. Putting $c = 1 = \hbar = h/2\pi$, $E = h\nu = \hbar\omega$ corresponds to $2\vartheta_0 \cdot \omega$, i.e., $\vartheta_0 = \frac{1}{2}$, and $c = \vartheta_0 \cdot \nu_0$ implies $\nu_0 = 2 = 0.1$TTHz (TTHz = teraterahertz = 10^{24}/second), because ϑ_0 is a fundamental length like 2.8×10^{-13} cm. From $\vartheta_0\omega_0 = \frac{1}{2} \cdot 2\pi\nu_0 = 2\pi$, I conclude $E_0 = 2 \cdot 2\pi/(1 + (2\pi)^2)^{1/2} \approx 2 = \hat{E}$ instead of $h\nu_0 = 2\pi \cdot 2$; so I obtain $\hat{E} = 2 = \hbar\nu_0 = 11.3$pJ (pJ = picojoule = 10^{-12} watt second) and—taking $y = E/\frac{1}{2}\hbar\nu_0 \wedge x = \vartheta_0\omega = \omega/\nu_0$ in $y = 2x/(1 + x^2)^{1/2}$—the approximate deviation

$$(*) \qquad E = \hbar\omega/(1 + (\omega/\nu_0)^2)^{1/2}$$

from Planck's $E = h\nu$ (1900).

Einstein's $eV = h\nu$ suggests 5 TTHz as the limiting frequency for the bremsstrahlung of the Stanford linear accelerator (circa 20 GeV). A statistical investigation of energy balances is perhaps a sufficiently sensitive instrument which may confirm that my prediction (*) is "probably" true.

Neither free choice nor chance can enter into an original net of spatial profiles and temporal fibres, which unifies smoothly all (local) motions "below" or "above" a measuring net that flattens and equalizes the (nontransformable/self-exhaustive) coordination/subdivision of its original net.

Identical return of all events is necessary, if the universal diagram is rimless. Earth and sun can survive the revolution of time, if the average net has no singularities (like a hypertorus). Higher qualities of motion form a diagram of multiple topological connectedness, whereby a peculiar couple, triple, ... of net lines coincide in [a finite hierarchy of] isolated cross-points [1, Figures 8.6, 7, 6, 5]: thus geometro-statics $\mathfrak{S}$ concretizes an intra-finite "kinematics" of Leibniz's monads.

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[3] ———, *Zum geometro-statischen Verhältnis von Lichtgeschwindigkeit, Wirkungsquantum und Elementarlänge im singularitätenfreien Diagramm eines Urmediums*, ***IVth International Congress for Logic, Methodology and Philosophy of Science,*** Bucharest, 1971, pp. 267–269. Abstract.

Syozo Watanabe, *Many-valued protothetics.*

In 1917 Jan Łukasiewicz introduced a three-valued propositional calculus with one designated truth-value and later generalized this to a many-valued propositional calculus with one designated truth-value.

On the other hand protothetic is one of the three logical systems formulated by Stanislaw Lesniewski and is the most general two-valued logical theory of propositions.

At the beginning of the last year I set myself the task of generalizing this two-valued protothetic to many-valued protothetics. In other words I have been trying to generalize many-valued propositional calculus to many-valued protothetics.

The distinguishing characteristic of many-valued protothetics compared with many-valued propositional calculus consists in admitting universal quantifiers binding propositional as well as functional variables of any semantic category. This enables us to introduce the concept of the basic propositions, which are defined by propositional variables, a universal quantifier, and the primitive function, that is, the weak implicator. In two-valued protothetics there are