domain element, whereas a change in a single Walsh coefficient is felt throughout the domain.

At this point in time the work appears to be highly developed and rich in mathematical elegance. It is not clear what the long term directions of the research are, nor what the present implications are. Since the research is largely stimulated by the need to solve practical problems in computer design, one might measure the impact of the research on present design. The impact, unfortunately, has been quite small, and is not likely to improve over time. The cost functions on which the research is predicated have turned out largely to be unrealistic characterizations of present technology, although they were reasonable characterizations of past technology. Practitioners today are able to use canonical realizations with or without small improvements from *ad hoc* analysis to design computers, and the costs of nonminimal circuits have been very close to the costs of absolutely minimal circuits. The theory no longer has to satisfy past constraints and may be driven in new innovative directions.

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Global variational analysis: *Weierstrass integrals on a Riemannian manifold*, by Marston Morse, Mathematical Notes, Princeton University Press, Princeton, New Jersey, 1976, ix + 255 pp., $6.50.

The first thing that comes to mind in reviewing a new book by Marston Morse on the calculus of variations is that he wrote a book, *The calculus of variations in the large*, forty years ago. The early book gave the foundations of what is now called Morse theory. The publication of a new book by Morse on the same subject presents an occasion to give some personal perspectives on how this mathematics has developed in the last few decades. I say "personal perspectives" and indeed, I, myself, have been involved in, and inspired by, Morse's mathematics. For example, three of my papers contain the word Morse in the title. Another mathematician much influenced by Morse, Raoul Bott, was my adviser, and even work of Morse (but not variational theory) suggested to Bott the thesis problem he gave me (leading eventually to my work in immersion theory).

Another factor in writing a review like this is that, today, global analysis is very much alive, both in mathematics and other disciplines. It may give us some perspective to trace the development of one of the main roots of the subject.

Let us see what Morse, in 1934, had to say about global analysis (he used the word macro-analysis, then). I quote the full first paragraph of the Foreword of his book.

"For several years the research of the writer has been oriented by a conception of what might be termed macro-analysis. It seems probable to the author that many of the objectively important problems in mathematical physics, geometry, and analysis cannot be solved without radical additions to