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Introduction to ergodic theory, by Ya. G. Sinai, Princeton Univ. Press, Princeton, New Jersey, 1977, 144 pp., $6.00.

The author has endeavored to present the general results of ergodic theory by examining special cases. His very considerable success testifies to the care and insight with which his examples, illustrating the methods and basic concepts of ergodic theory, have been chosen. The examples are, moreover, explained very clearly and at a level which should make the book accessible to a wide audience. The reader should be warned, however, that some of the results appear on first reading to be simpler than they really are, and that not all areas of ergodic theory are treated. The last section of this review will discuss a particularly important omission.

Ergodic theory arose from efforts to abstract some mathematically interesting aspects of dynamical systems. Two such systems, which are very closely connected, may be studied as examples. Consider first an ideal gas whose molecules are subject to the laws of classical mechanics and which are enclosed in a container. Statistical mechanics consists of the study of this system, and especially of the limiting behavior of its properties as the number of molecules tends to infinity. As a second example, consider a planetary system also subject to the laws of classical mechanics. Celestial mechanics deals with the study of such planetary systems. The second example differs from the first merely in that the case of interest is not the limiting one, and in that there are no collisions against the walls of a container. Ergodic theory is, to a large extent, the study of ideas which have their origin in statistical or celestial mechanics.

We proceed now to the concept of phase space, which has come to be a crucial idea in the study of dynamical systems. Phase space does not correspond to the physical space of the dynamical system. It is rather a representa-