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CHAOS THEORY

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Chaos theory is involved in the study of any unpredictable system, whether it is the stock market, weather, or a game of pool. Chaotic systems all have similar characteristics. The first is that they are deterministic in such a way that there is always some aspect to the system that determines its behavior. The second is that they are highly sensitive to initial conditions. A small change in these conditions will result in a large variety of outcomes. A third characteristic of chaotic systems is that they appear to be random and disorderly but actually have a sense of pattern and order. In this case the system can have a range of expected behaviors but the exact behavior will never be able to be predicted.

To study chaos theory, an electric circuit was built to model the behavior of an elastic ball bouncing on an oscillating table. The control parameters for this system were the elasticity of the ball, the frequency of the oscillating table, the amplitude of oscillation of the table, and the coefficient of instantaneous restitution. This system's behavior is determined by the values of these control parameters and is susceptible to the initial conditions of the control parameters. The outcome is unpredictable due to this susceptibility; thus it can be acknowledged as a chaotic system.