

More differential equations

1. The dead body of an eccentric socialite is found in a Las Vegas motel room. At 10:00 am, her body temperature was measured to be 92.4°F . Her body was left in the room for an hour and at 11:00 am her body temperature was 90.5°F . The room itself was kept at a constant temperature of 72°F .

Use *Newton's law of cooling* to estimate the time of the socialite's death.

(*) See Example 3 in section 15.6.

2. The population of a tropical island grows at a rate that is proportional to the *third root* ($\sqrt[3]{}$) of its size. In 1950, the islands population was 1728 and in 1980, the islands population was 2744. What will the islands population be in 2020?
3. The income-elasticity of monthly demand (q) for a price-controlled good is assumed to be proportional to the natural logarithm of average monthly disposable income (y) in the market for that good. When $y = 2500$, the demand is $q = 500$ and when $y = 2000$, the demand is $q = 350$. What is the predicted monthly demand for this good if monthly disposable income decreases to $y = 1500$?