

1. Debra's kiln is in a large room with a fixed temperature of 80°F . Initially the temperature of the kiln is 1975°F . Three hours later the kiln has cooled to a temperature of 1400°F . How much longer will it take for her kiln to cool to 200°F ? At this point the kiln will be cool enough for her to remove objects safely.

To solve this, use Newton's law of cooling: the rate of change of the temperature of an object is proportional to the difference in temperature between the object and the constant room temperature.

2. Compute the limit of each sequence. It may be helpful to use a calculator to guess the answer, but then prove it.

(a) $a_n = \left(1 + \frac{1}{n}\right)^n$

(b) $b_n = \left(1 + \frac{1}{n^2}\right)^n$

(c) $c_n = \left(1 + \frac{1}{\sqrt{n}}\right)^n$

3. (Making a return from last week.) Let R be the region in the first quadrant bounded by the x -axis, the y -axis, and the curve $y = e^{-x}$. Consider the solid S generated by revolving R about the x -axis.

(a) Is the volume of S finite?

(b) Is the surface area of S finite?