

Linear Models

Forensic scientists use the lengths of the tibia (t), the bone from the ankle to the knee, and the femur (r), the bone from the knee to the hip socket, to calculate the height of a person. A person's height (h) is determined from the lengths of these bones using functions defined by the following formulas. All measurements are in centimeters.

For men:

$$h = 69.09 + 2.24r \text{ or } h = 81.69 + 2.39t.$$

For women:

$$h = 61.41 + 2.32r \text{ or } h = 72.57 + 2.53t.$$

- a) Record the measurements (in centimeters) of your tibia and femur.
- b) Based on these measurements, use the appropriate formula to calculate your height in centimeters.
- c) Calculate your actual height in centimeters.
- d) Which formula is more accurate?

A company's cost of producing a product and the revenue from selling the product can be expressed as linear functions. The idea of break-even analysis then can be explained using the graphs of these functions. When cost is greater than revenue earned, the company loses money; when cost is less than revenue, the company makes money; and when cost equals revenue (called the break-even point), the company breaks even.

Tony Motton runs a copying service in his home. He paid \$3500 for the copier and a lifetime service contract. Each sheet of paper he uses costs \$.01, and he gets paid \$.05 per copy he makes. Find the number of copies Tony has to make to break-even.