

Using Simpson's Rule for the normal distribution

This problem uses Simpson's rule to approximate a definite integral important in probability.

In our probability unit, we learned that when given a probability density function $f(x)$, we may compute the probability P that an event x is between a and b by calculating the definite integral:

$$P(a \leq x \leq b) = \int_a^b f(x) dx.$$

Here we're assuming that a probability density function $f(x)$ has the property that

$$\int_{-\infty}^{\infty} f(x) dx = 1.$$

In the next session, we will show that $f(x) = \frac{1}{\sqrt{\pi}}e^{-x^2}$ is a probability density function with this property. For now, we assume this property.

Question: Suppose the probability density function for American male height is roughly (in inches x)

$$h(x) = \frac{1}{2.8\sqrt{2\pi}}e^{-(x-69)^2/5.6}.$$

- Use Simpson's rule to estimate the probability that an American male is between 5 and 6 feet tall.
- Use Simpson's rule to estimate the probability that an American male is over 8 feet tall.

MIT OpenCourseWare
<http://ocw.mit.edu>

18.01SC Single Variable Calculus
Fall 2010

For information about citing these materials or our Terms of Use, visit: <http://ocw.mit.edu/terms>.