

Class 24: More Probability Density:

Means and the Normal Distribution

Calculus II

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You continue to create unicorns from cosmic rays. After several months you have a lot of unicorns. You notice that the mass of the unicorns are not all the same. You take some measurements, do some math, and conclude that the distribution of unicorn masses is well approximated by:

$$\rho(x) = \frac{1}{10\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x-200}{10}\right)^2}, \quad (1)$$

where x is the unicorn mass measured in kilograms.

1. Sketch $\rho(x)$. Use a computer if you want, but be sure to understand why the distribution looks the way it does.
2. What is the probability that a randomly-chosen unicorn has a mass between 190 and 210?
3. What is the probability that a randomly-chosen unicorn has a mass of 200?
4. What is the probability that a randomly-chosen unicorn has a mass greater than 200?
5. What is the probability that a randomly-chosen unicorn has a mass between 0 and infinity?