

Mathematics 103 — Section 202 — Spring 2001

Seventh homework — due Friday, March 9

Exercise 1. A certain probability density is of the form $Ce^{-t/\tau}$ for a constant τ . What is C ?

Exercise 2. What is the probability of getting between 5 and 8 heads (inclusive) in a toss of 13 balanced coins?

Exercise 3. Make a bar graph of the probabilities for the total score in a toss of two dice.

Exercise 4. What is the probability of getting between 30 and 40 heads (inclusive) in a toss of 50 balanced coins? (Get the answer exactly, and then use the table of areas under the bell curve.)

Exercise 5. The probability density of a light bulb failing at time t is $Ce^{-t/100}$ for t in days. (a) What is C ? (b) What is the probability that a light bulb lasts at least 100 days? (c) What is the mean life of a light bulb? (d) The median? (e) The probability of lasting at least T days?

Exercise 6. The probability that a certain radioactive atom will disintegrate is $Ce^{-t/\tau}$ for some constant τ . (a) If the half-life of this substance is 4 days, what is τ ? (b) Same assumption as in (a). What is C ?

Exercise 7. A certain population of males has height distribution given by the bell curve

$$\frac{1}{\sigma\sqrt{2\pi}}e^{-(x-\mu)^2/\sigma^2}$$

with $\mu = 180$ and $\sigma = 10$ (in cm). What proportion of them have height 170 or more?

Exercise 8. Find the coordinates of the centroid of the region $0 \leq x \leq 1$, $y \leq \sqrt{x}$.

Exercise 9. Estimate

$$\int_0^1 e^{-x^2} dx$$

Exercise 10. (a) If p is the exact probability of getting 50 heads from a toss of 100 coins, what is the exact probability of getting between 49 and 51 heads from a toss of 100 coins. (b) Estimate p , telling how you did so.