

# Continuous Random Variables: Practice Problems

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1. Random variable  $X$  follows a uniform distribution between 0 and 6. What is its variance?
2. Car cooling systems are controlled by electrically driven fans. Suppose that the lifetime  $T$  of a particular make of fan follows the exponential distribution with  $\lambda = 0.0005$ . Which proportion of fans will give less than 50000 hours of service?
3. The patient recovery time from a particular surgical procedure is normally distributed with a mean of 5.3 days and a standard deviation of 2.1 days. What is the probability of a random patient spending more than two days in recovery?
4. Consider  $F(x)$ , the cumulative distribution function of some continuous distribution on  $[0; +)$  below.

$$F(x) = 1 - e^{-\frac{x^2}{2}}, \quad x > 0$$

- (a) What is the density function  $p(x)$  of this distribution?
  - (b) Find the expected value  $EX$  of the random variable  $X$  coming from the distribution above.
5. Suppose that a random variable  $X$  takes values between 0 and 1 and has probability density function  $p(x) = 2x$  on that interval, and 0 otherwise.
    - (a) Find  $P(X > 0.5)$
    - (b) Find  $P(< 0.1)$
    - (c) Find  $EX$
    - (d) Let random variable  $Y = e^X$ . Find  $EY$ .
  6. Assume that SAT scores are normally distributed with a mean of 1518 and a standard deviation of 325.
    - (a) Only 10% of those who take SAT obtain a score higher than
    - (b) If 100 SAT scores are randomly selected, find the probability that they have a mean score between 1440 and 1480.