

This is the fifth homework assignment. Students should tick in [TUWEL](#) problems they have solved and upload their detailed solutions by **20:00 on Monday November 13, 2023**.

1. **Basketball free throws**

Two professional basketball players, Bobby and Eliot, each throw twelve free throws with a basketball. Bobby makes 85% of the free throws he tries, while Eliot makes 78% of the free throws he tries. Player who achieves the highest score wins the game. It is assumed that the two players do not influence each other when throwing. Use **R** to compute the probability that Eliot will win the game.

2. **Mail order company**

A mail order company provides free examination of its products for 7 days. If not completely satisfied, a customer can return the product within that period and get a full refund. According to past records of the company, an average of 2 of every 10 products sold by this company are returned for a refund.

- (a) Compute the probability that no more than 6 of the 40 products sold by this company on a given day will be returned for a refund.
- (b) Use a Poisson distribution to approximate the probability in (a). What can be said about the accuracy of this approximation?

3. **Human resource testing**

Some human resource departments administer standard IQ tests to all employees. The Stanford-Binet test scores are well modeled by a Normal model with expectation 100 and standard deviation 16.

- (a) If the applicant pool is well modeled by this distribution, what is the probability that a randomly selected applicant would have the score between 84 and 116?
- (b) For the IQ test administered by human resources, what cutoff value would separate the middle 90%?

4. **Coin throws**

An unfair coin is thrown 600 times. The probability of getting a tail in each throw is $\frac{1}{4}$.

- (a) Use a Binomial distribution to compute the probability that the number of heads obtained does not differ more than 10 from 440.
- (b) Use a Normal approximation without a continuity correction to calculate the probability in (a). How does the result change if the approximation is provided with a continuity correction?

5. Cars arrivals

Suppose cars arrive at a parking lot at a rate of 50 per hour. Assume that the process is modeled by a Poisson random variable with $\lambda = 50$.

- (a) Compute the probability that in the next hour the number of cars that arrive at this parking lot will be between and including 54 and 62.
- (b) Compare the value obtained in (a) with the probability calculated by using a Normal approximation.