

Bus 274: Further Statistics for Business

Spring 2015

ADDITIONAL PROBLEMS

Problem: Weekly demand for rice (measured in kg) in a supermarket is normally distributed with expectation 600 and standard deviation 120.

- Why is it reasonable to consider weekly demand a *random* variable?
- Compute the probability that next week's demand exceeds 700kg. (Hint: One of the following will be helpful: $\frac{600-120}{700} \approx 0.69$, $\frac{600-120}{\sqrt{700}} \approx 18.14$, $\frac{700-600}{120} \approx 0.83$, $\frac{700-600}{\sqrt{120}} \approx 9.13$.)
- Let Y = demand for rice in this supermarket in a month (1 month = 4 weeks). Find the distribution of Y . (Give the distribution, together with the numerical values of all parameters.)
- Compute the probability that $P(Y < 2160)$.
- It holds that $P(Y \leq 2900) \approx 0.98$. How can the management use this information in its rice ordering policy? (Please discuss briefly and give precise recommendations.)

MCQ 1: Istanbul's daily average temperature (measured in °C) in February is approximately normally distributed with mean 6 and standard deviation of 4. What is the probability that the average temperature on February 1st is above 0°C?

- A: 50%.
B: $P(Z > -3)$ where $Z \sim N(0, 1)$.
C: $P(Z < -1.5)$ where $Z \sim N(0, 1)$.
D: Above 90%.
E: Below 70%.

MCQ 2: The interarrival time (measured in minutes) of customers entering a shop during Tuesday afternoons is an exponentially distributed random variable with a mean of 5 minutes. What is the conditional probability that the waiting time for the next customer's arrival takes at least 10 minutes, given that it has already exceeded 5 minutes?

- A: 5/10.
B: e^{-1} .
C: $1 - e^{-5 \cdot 10}$.
D: e^{-5} .
E: e^{-2} .

MCQ 3: If $P(X = -1) = 3/6$, $P(X = 0) = 2/6$, $P(X = 1) = 1/6$, then:

A: $E(X) = 1/3$

B: $E(X) = 2/3$

C: $\text{var}(X) = 5/9$

D: $\text{var}(X) = 2/3$

E: $P(X = (-1)^2) = 1/3$

MCQ 4: A photographer wants to take pictures of fireworks from a terrace overlooking the Bosphorus. There is an average number of 3 fireworks in this area on Friday evenings between 21:00 and 0:00.

A: The number of fireworks in this area is approximately Poisson distributed with parameter $\lambda = 1/3$.

B: The probability that there is no firework is approximately e^{-3} .

C: The probability that there is at least one firework between 21:00 and 22:00 is $1/3$.

D: The standard deviation of the number of fireworks is 3.

E: The number of fireworks is approximately binomially distributed with parameters $n = 3$ and $p = 0.5$.

MCQ 5: If $X \sim B(50, 0.4)$, then:

A: $X \sim N(50, 20)$ approximately, according to the CLT.

B: $X \sim \text{Po}(50)$ approximately, according to the CLT.

C: $E(X) = 50$.

D: $\text{var}(X) = 20$.

E: X is the number of successes in 50 independent Bernoulli trials, where each trial results in success with probability 40%.

MCQ 6: Weekly demand for bulgur (measured in kg) in a supermarket is normally distributed with expectation 700 and standard deviation 160. Consider the probability that next week's demand exceeds 800kg.

A: This probability is useless for the supermarket management.

B: This probability can be determined using $\frac{800-700}{700} = 0.91$.

C: This probability is $\frac{800-700}{160} = 0.625$.

D: This probability can be determined using $\frac{800-700}{\sqrt{160}} = 7.91$.

E: This probability is above $1/4$.

MCQ 7: Weekly demand for peas (measured in kg) in a supermarket is normally distributed with expectation 400 and standard deviation 120. Consider monthly demand Y (1 month = 4 weeks).

- A:* Y is non-random, only weekly demand is a random variable.
- B:* Y is normally distributed with expectation 1600 and standard deviation 480.
- C:* The probability that weekly demand exceeds 520 kg equals the probability that monthly demand exceeds $4 \cdot 520 = 2080$ kg.
- D:* The probability that monthly demand equals 4000 kg is 50%.
- E:* Monthly demand has standard deviation 240.

MCQ 8: In a survey, 30 randomly selected business students at Bilgi University are asked to answer the following question: “Would you prefer an online course in statistics to the traditional course?” Let X be the number of students in this survey who say “Yes”.

- A:* In any case, the probability that a randomly selected student says “Yes” is 50%.
- B:* If 30% among all business students say “Yes”, then X has a binomial distribution with parameters 30 and 0.3.
- C:* If 30% among all business students say “Yes”, then 30% in the survey will say “Yes”.
- D:* The variance of the number of students in the survey saying “Yes” does not depend on the sample size.
- E:* X has a Poisson distribution with parameter 0.5.