

Introduction to Statistics - Quiz #1 (60 minutes)

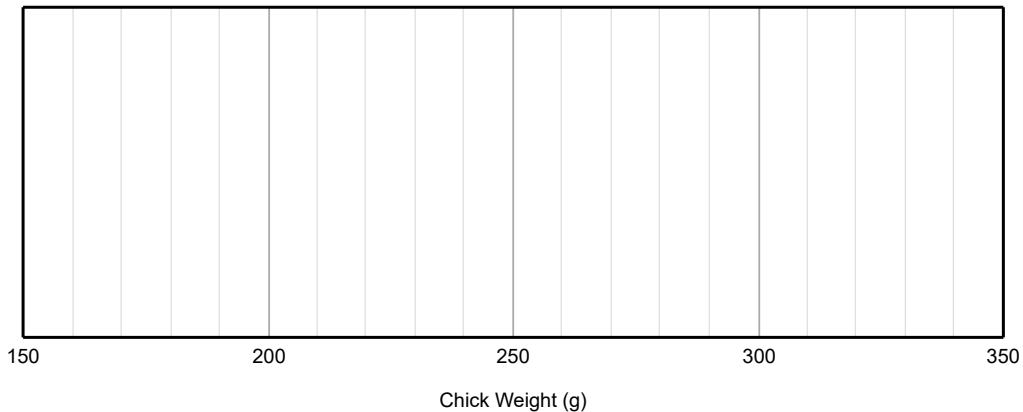
March 19, 2026 (Thursday)

Section(교반): _____ Cadet Number(교번): _____ Name(성명): _____ Score: _____

- All solutions must include a detailed step-by-step explanation.
- If an answer has more than four decimal places, round to the **fourth decimal place**.

1. The table below shows descriptive statistics for chick weights (in grams) when soybean meal was used as a feed additive. Based on these values, draw a boxplot for chick weights in the blank graph provided. [30 points]

Minimum	Q_1	Median (Q_2)	Q_3	Maximum	Mean
158	206.75	248.0	270.00	329	246.43



2. A company installs security cameras at its building. The probability that a camera's sensor is defective is 0.03. When a camera runs all day, a camera with a defective sensor has a 0.8 probability of losing its picture, while a camera with a normal sensor has only a 0.04 probability of losing its picture. Answer the following questions. [30 points]

(1) Find the probability that a randomly chosen camera loses its picture during operation. (Define all events clearly before solving.)

(2) Find the conditional probability that a randomly chosen camera has a defective sensor, given that it has lost its picture.

3. The joint probability mass function of two random variables X and Y and its table are given below. Answer the following questions. [40 points]

$$f(x, y) = \begin{cases} \frac{x+y}{9}, & x = 0, 1, 2, y = 0, 1 \\ 0, & \text{otherwise} \end{cases}$$

$x \backslash y$	0	1
0	0	1/9
1	1/9	2/9
2	2/9	3/9

(1) Find the marginal probability mass function $f_X(x)$ of X .

(2) The marginal probability mass function $f_Y(y)$ of Y is given below. Find the variance $\text{Var}(Y)$. (You may use $E(Y) = \frac{2}{3}$.)

$$f_Y(y) = \begin{cases} 1/3, & y = 0 \\ 2/3, & y = 1 \\ 0, & \text{otherwise.} \end{cases}$$

(3) Find $E(2X - 3Y + 4)$.

(4) Determine whether X and Y are independent.