Examples on Interpolation and Statistics

x	12	14	16
y	24	37	25

The Lagrange polynomial that passes through the three data points shown in the table is given by: $f(x) = L_1(x) \times 24 + L_2(x) \times 37 + L_3(x) \times 25$. What is the value of $L_2(15)$?

- $-\frac{3}{4}$
- $\frac{3}{4}$
- $1\frac{1}{4}$
- Cannot be calculated

x	15	18	22
y	24	37	25

If $L_1(16) = \frac{4}{7}$, $L_2(16) = \frac{1}{2}$, $L_3(16) = -\frac{1}{14}$, then $f(16)$ can be estimated as:

- 30.42
- 30.21
- 30.6
- Cannot be estimated

x	0	10	15	20	22.5	30
y	0	27.7	36.3	51.5	60.4	89.2

Given the following data points and using Quadratic Lagrange Interpolation to find the value of $f(32)$, which of these data points must be used to have the best estimation:

- $(20,\ 51.5),\ (30,\ 89.2)$
- $(30,\ 89.2),\ (22.5,\ 60.4)$
- $(22.5,\ 60.4),\ (30,\ 89.2),\ (20,\ 51.5)$
- Cannot be estimated

For $N = 3$, Lagrange $L_1(x_3)$ can be evaluated as:

- 1
- $\frac{x_3 - x_1}{x_1 - x_3} \times \frac{x_3 - x_2}{x_1 - x_3}$
- $\frac{x_1 - x3}{x_1 - x_3} \times \frac{x_2 - x_3}{x_1 - x_3}$
- 0

Reading	1	2	3	4	5
X (cm)	49.3	50.1	48.9	49.2	50.2

The table shows the sample data. The standard deviation of the sample data is:

- $\sqrt{\frac{\sum_{i=1}^{5}\left(x_i - \bar{x}\right)}{4}}$
- $\sqrt{\frac{\sum_{i=1}^{5}\left(x_i - \bar{x}\right)^2}{4}}$
- $\sqrt{\frac{\sum_{i=1}^{5}\left(x_i - \bar{x}\right)^2}{5}}$
- Approximately 50 cm.

If the mean life of the corona virus is 180 min and the standard deviation is 20 min. Then, 68% of all viruses could be active between _____ min and _____ min.

- 170 and 190
- 160 and 200
- 120 and 240
- 140 and 220

In a population, if the mean is $\mu = 125$ and the standard deviation is $\sigma = 25$, how common are the values in the range from 75 to 175?

- $86\ \%$
- $95\ \%$
- $99.7\ \%$
- $68\ \%$

For a large population, the probability of a random variable falls below $\mu - 2\,\sigma$ is:

- 0.035
- 0.05
- 0.025
- 0.25

The annual salary of employees in a company is approximately normally distributed with a mean of $50,000$ and a standard deviation of $20,000$. What is the percentage of people who earn more than $40,000$?

- 85.15%
- -30.85%
- 69.15%
- 30.85%

What is the area under the curve for a z-score of 1.2?

- 0.8849
- 0.8944
- 0.8980
- 0.8997

Let *x* be a normal random variable with a mean of 50 and a standard deviation of 3. A *z* score was calculated for *x*, and the *z* score is -1.25. What is the value of *x*?

- 53.25
- 53.75
- 46.25
- 46.4

Suppose X is normally distributed with mean 5 and standard deviation 0.4. We find $P(X \leq X_0) = P(Z \leq 1.3)$. What is the value of X_0 ?

- 5.52
- 0.52
- -5.25
- 55.2%

Suppose X is normally distributed with mean 5. If $P(X \leq 6) = 0.6700$ what is the approximate value of the standard deviation of X ?

- 2.27
- 27.3
- 32.5%
- 0.44