

\textbf{ST 301 (AKI)}

\textbf{R output}

\texttt{> pnorm(2)}
    \[1\] 0.9772499

\texttt{> A=c(0.995,0.99,0.98,0.975,0.95,0.9)}

\texttt{> round(qnorm(A,mean=0,sd=1),4)}
    \[1\] 2.5758 2.3263 2.0537 1.9600 1.6449 1.2816

\texttt{> round(qt(A,df=3),3)}
    \[1\] 5.841 4.541 3.482 3.182 2.353 1.638

\texttt{> round(qt(A,df=4),3)}
    \[1\] 4.604 3.747 2.999 2.776 2.132 1.533

\texttt{> round(qt(A,df=5),3)}
    \[1\] 4.032 3.365 2.757 2.571 2.015 1.476

\texttt{> round(qchisq(A,df=1),2)}
    \[1\] 7.88 6.63 5.41 5.02 3.84 2.71

\texttt{> round(qchisq(A,df=2),2)}
    \[1\] 10.60 9.21 7.82 7.38 5.99 4.61

\texttt{> round(qchisq(A,df=3),2)}
    \[1\] 12.84 11.34 9.84 9.35 7.81 6.25

\texttt{> round(qchisq(A,df=4),2)}
    \[1\] 14.86 13.28 11.67 11.14 9.49 7.78

\texttt{> round(qchisq(A,df=5),2)}
    \[1\] 16.75 15.09 13.39 12.83 11.07 9.24
1. Suppose three events $A$, $B$ and $C$ are such that $B$ and $C$ are mutually exclusive and $P(A) = 0.5$, $P(B) = 0.3$, $P(C) = 0.2$, $P(A|B) = \frac{1}{3}$, and $P(\bar{A}C) = 0.1$. What is the probability that only one of the three events occurs?

(a) 0.6 (b) 0.2 (c) 0.4 (d) 0.5 (e) None of them

2. A book club announces a sweepstakes to attract new subscribers. The prizes and the corresponding chances are listed here:

<table>
<thead>
<tr>
<th>Prize</th>
<th>Chance</th>
</tr>
</thead>
<tbody>
<tr>
<td>$50</td>
<td>1 in 500</td>
</tr>
<tr>
<td>$10</td>
<td>1 in 100</td>
</tr>
<tr>
<td>$2</td>
<td>1 in 20</td>
</tr>
<tr>
<td>$1</td>
<td>1 in 10</td>
</tr>
</tbody>
</table>

What is the expected winnings?

(a) $0.4 (b) $0 (c) $1 (d) Can not be calculated from above information. (e) None of them

3. A backpacking party carries three emergency signal flares, each of which will light with a probability of 0.9. Assuming that the flares operate independently. What is the probability that two flares light?

(a) $\left(3\right)0.1^20.9^1$ (b) $\left(3\right)0.1^10.9^2$

(c) $\left(2\right)0.1^10.9^2 + \left(1\right)0.1^20.9^1$ (d) $1 - 0.9^3$ (e) None of them

4. Consider Bernoulli trials with success probability $p = 0.7$. What is the probability that more than 5 trials are needed to obtain 2 successes?

(a) $\left(5\right)0.7^20.3^3$ (b) $\left(5\right)0.7^20.3^3$

(c) $\left(2\right)0.7^20.3^3 + \left(1\right)0.7^10.3^4$ (d) $\left(1\right)0.7^10.3^4 + \left(0\right)0.3^5$ (e) None of them

5. Suppose there are two boxes. Box 1 contains 10 articles, of which 6 are defective, and Box 2 contains 20 articles, of which 5 are defective. First, a box is selected at random and then, from the selected box, one article is drawn at random and without replacement. Let $Y$ denote the number of defective articles in the sample. What is probability of $Y = 1$

(a) $\frac{11}{30}$ (b) $\frac{6}{10} + \frac{5}{20}$ (c) $\frac{6}{10} \times \frac{25}{20} + \frac{14}{10} \times \frac{5}{20}$ (d) $\frac{1}{2} \times \frac{6}{10} + \frac{1}{2} \times \frac{5}{20}$ (e) None of them

6. The probability of having a male child is 0.5, and a young couple only have a girl. If they plan to have at least three children, what is the probability that their third child is the second son?
7. Let the number of successes $X$ have a binomial distribution with $p = 0.25$ and $n = 100$. What is the approximate probability of $25 \leq X \leq 100$?
(a) 0.34 (b) 0.6 (c) 0.5 (d) 0 (e) None of them

8. An experimenter always calculates 98% confidence intervals for a mean. After 200 applications, about how many of these intervals would actually cover the respective means?
(a) 200 (b) 98 (c) 196 (d) Can not be decided. (e) None of them

9. With a random sample of size $n = 100$, someone proposes $(-0.196, 0.196)$ to be a 95% confidence interval for $\mu$. Which one is NOT correct?
(a) The sample mean is 0 (b) The sample standard deviation is 1 (c) The 95% error margin is 0.196. (d) The 95% error margin is 0.392. (e) The Hypothesis test $H_0 : \mu = 0$ VS $H_0 : \mu \neq 0$ will not be rejected at a significant level 0.02.

10. Two methods that can be used to train the students and exams are conducted to evaluate the students’ performance. The average score of students trained by the first method is 6. Let $\mu_1$ be the population mean score of Method 1 and $\mu_2$ be the population mean score of Method 2. To conduct test checking whether $\mu_1$ is different from $\mu_2$, which one is correct?
(a) $H_0 : \mu_2 = 6; H_1 : \mu_2 \neq 6$ (b) $H_0 : \mu_1 = \mu_2; H_1 : \mu_1 \neq \mu_2$ (c) $H_0 : \mu_1 = \mu_2; H_1 : \mu_1 > \mu_2$ (d) $H_0 : \mu_1 = \mu_2; H_1 : \mu_1 < \mu_1$ (e) None of them

11. With a random sample from normal distribution of size $n = 9$, by using $t$-statistic, someone proposes $(-1.306, 3.306)$ to be a 95% confidence interval for $\mu$. Which one is correct for the Hypothesis test $H_0 : \mu = 0; H_1 : \mu \neq 0$?
(a) If significant level $\alpha = 0.05$, we will reject $H_0$ (b) If significant level $\alpha = 0.02$, we will reject $H_0$ (c) If significant level $\alpha = 0.01$, we will not reject $H_0$ (d) If significant level $\alpha = 0.005$, we will reject $H_0$ (e) None of them

12. Suppose you are to verify the claim that $\mu \neq 20$ on the basis of a random sample of size 100, and you know that $\sigma = 10$. Which one is correct?
(a) The test statistic is $\bar{X}$. (b) The rejection region is $\bar{X} > 21.96$, if the level of significance is 0.025. (c) The rejection region is $|\bar{X} - 20| > z_{\alpha/2}$, where $\alpha$ is the level of significance. (d) The test should be $H_0 : \mu \neq 20; H_1 : \mu = 20$. (e) None of them.
13. A large mail-order firm employs numerous persons to take phone orders. Computers on which orders are entered also automatically collect data on phone activity. One variable useful for planning staffing levels is the number of calls per shift handled by each employee. From the data collected on 25 workers, calls per shift were:

   3  7  9  20  21

The first quartile is:
(a) 3  (b) 7  (c) 9  (d) 20  (e) None of them

14. If $X$ has a normal distribution with $\mu = -1$ and $\sigma^2 = 4$, find $b$ such that $P(X > b) = 0.025$

   (a) $b = 1.96$  (b) $b = 2.92$
   (c) $b = 3.92$  (d) $b = 6.84$
   (e) None of them

15. Suppose $Q_1$ and $Q_3$ are the first and third quartiles of the t distribution of a certain d.f., respectively. How are these two related?

   (a) $|Q_1| = |Q_3|$  (b) $|Q_1| > |Q_3|$
   (c) $|Q_1| < |Q_3|$  (d) $Q_3 = 3 \times Q_1$
   (e) None of them

16. If $P(A)=.7$ and $P(B)=.4$, which statement of the following is true?

   (a) $A$ and $B$ are mutually exclusive
   (b) $A$ and $B$ are not mutually exclusive
   (c) More information are needed to determine whether $A$ and $B$ are mutually exclusive or not
   (d) $P(AB)=.28$  (e) None of them
17. Independent random samples from two populations have provided the summary statistics

<table>
<thead>
<tr>
<th>Sample 1</th>
<th>Sample 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>( n_1 = 40 )</td>
<td>( n_2 = 50 )</td>
</tr>
<tr>
<td>( \bar{x} = 20 )</td>
<td>( \bar{x} = 10 )</td>
</tr>
<tr>
<td>( s_1^2 = 40 )</td>
<td>( s_2^2 = 50 )</td>
</tr>
</tbody>
</table>

What is the point estimate of \( \mu_1 - \mu_2 \) and the estimated standard error?

(a) the point estimate of \( \mu_1 - \mu_2 \) is 10 and the estimated standard error is \( \sqrt{2} \)
(b) the point estimate of \( \mu_1 - \mu_2 \) is -10 and the estimated standard error is \( \sqrt{2} \)
(c) the point estimate of \( \mu_1 - \mu_2 \) is 10 and the estimated standard error is 2
(d) the point estimate of \( \mu_1 - \mu_2 \) is -10 and the estimated standard error is 2
(e) None of them

18. Independent random samples from two populations have provided the summary statistics

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</thead>
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<tr>
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</tr>
<tr>
<td>( \bar{x} = 20 )</td>
<td>( \bar{x} = 10 )</td>
</tr>
<tr>
<td>( s_1^2 = 40 )</td>
<td>( s_2^2 = 50 )</td>
</tr>
</tbody>
</table>

What is the 100(1 - \( \alpha \))% confidence interval for \( \mu_1 - \mu_2 \)?

(a) the 100(1 - \( \alpha \))% confidence interval for \( \mu_1 - \mu_2 \) is \((10 - z_{\alpha/2} \sqrt{2}, 10 + z_{\alpha/2} \sqrt{2})\)
(b) the 100(1 - \( \alpha \))% confidence interval for \( \mu_1 - \mu_2 \) is \((-10 - t_{\alpha/2} \sqrt{2}, 10 + t_{\alpha/2} \sqrt{2})\)
(c) the 100(1 - \( \alpha \))% confidence interval for \( \mu_1 - \mu_2 \) is \((10 - z_\alpha \sqrt{2}, 10 + z_\alpha \sqrt{2})\)
(d) the 100(1 - \( \alpha \))% confidence interval for \( \mu_1 - \mu_2 \) is \((10 - z_{\alpha/2}^2, 10 + z_{\alpha/2}^2)\)
(e) None of them

19. Independent random samples from two Normal populations have provided the summary statistics

<table>
<thead>
<tr>
<th>Sample 1</th>
<th>Sample 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>( n_1 = 4 )</td>
<td>( n_2 = 5 )</td>
</tr>
<tr>
<td>( \bar{x} = 20 )</td>
<td>( \bar{x} = 10 )</td>
</tr>
<tr>
<td>( s_1^2 = 8 )</td>
<td>( s_2^2 = 10 )</td>
</tr>
</tbody>
</table>
which one is correct for testing $H_0 : \mu_1 - \mu_2 = 10$?
(a) t-test with pooling will be used and the test statistic equals to 0
(b) t-test without pooling will be used and the test statistic equals to 0
(c) t-test with pooling will be used and the test statistic equals to -20
(d) z-test with pooling will be used and the test statistic equals to -20
(e) None of them

20. Given the following paired sample data,

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>9</td>
<td>9</td>
</tr>
</tbody>
</table>

For conducting matched pair comparison, test $H_0 : \delta = 0$ vs $H_1 : \delta \neq 0$. what are the t statistic used and the d.f. of the statistic?

(a) the t statistic equals to $\sqrt{3}$ and the d.f. of the statistic is 3
(b) the t statistic equals to 3 and the d.f. of the statistic is 4
(c) the t statistic equals to $\sqrt{2}$ and the d.f. of the statistic is 6
(d) the t statistic equals to 2.6 and the d.f. of the statistic is 3
(e) None of them

21. Given the following paired sample data,

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>9</td>
<td>9</td>
</tr>
</tbody>
</table>

Suppose the P-value for testing $H_0 : \delta = 0$ vs $H_1 : \delta \neq 0$ equals to 0.02, which one is correct?

(a) $H_0$ will be rejected under significant level 0.05
(b) $H_0$ will be rejected under significant level 0.01
(c) A 95% confidence interval for $\delta$ will cover 0
(d) A 90% confidence interval for $\delta$ will cover 0
(e) None of them

22. To estimate a population proportion $p$, suppose that $n = 50$ units are randomly sampled and $x = 30$ of the sampled units are found to have the characteristic of interest. What is point estimate of $p$ and its 95% error margin?

(a) the point estimate of $p$ is 0.6 and the 95% error margin is 0.136
(b) the point estimate of $p$ is 0.4 and the 95% error margin is 0.136
(c) the point estimate of $p$ is 0.6 and the 95% error margin is 0.069
(d) the point estimate of $p$ is 0.4 and the 95% error margin is 0.069
(e) None of them

23. Applicants for public assistance are allowed an appeals process when they feel unfairly treated. At such a hearing, the applicant may choose self-representation or representation by an attorney. The appeal may result in an increase, decrease, or no change of the aid recommendation. Court records of 320 appeals cases provided the following data.

<table>
<thead>
<tr>
<th>type</th>
<th>Increase</th>
<th>Unchanged</th>
<th>Decreased</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self</td>
<td>59</td>
<td>108</td>
<td>17</td>
</tr>
<tr>
<td>Attorney</td>
<td>70</td>
<td>63</td>
<td>3</td>
</tr>
</tbody>
</table>

Which one is correct?

(a) We can test the independence by the test statistic $\chi^2 = \sum_{cell} \frac{(O-E)^2}{E}$ and the corresponding d.f. is 2
(b) We can test equal proportion by two sample z test for the proportion
(c) We can test the independence by the test statistic $\chi^2 = \sum_{cell} \frac{(O-E)^2}{E}$ and the corresponding d.f. is 1
(d) We can test equal proportion by the test statistic $\chi^2 = \sum_{cell} \frac{(O-E)^2}{E}$ and the corresponding d.f. is 1
(e) None of them
24. Applicants for public assistance are allowed an appeals process when they feel unfairly treated. At such a hearing, the applicant may choose self-representation or representation by an attorney. The appeal may result in an increase, decrease, or no change of the aid recommendation. Court records of 320 appeals cases provided the following data.

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<th>type</th>
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<th>Unchanged</th>
<th>Decreased</th>
</tr>
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<tbody>
<tr>
<td>Self</td>
<td>59</td>
<td>108</td>
<td>17</td>
</tr>
<tr>
<td>Attorney</td>
<td>70</td>
<td>63</td>
<td>3</td>
</tr>
</tbody>
</table>

The test statistic \( \chi^2 = \sum_{cell} \frac{(O-E)^2}{E} = 13.9 \). Which one is correct?

(a) For testing the independence, the conclusion is reject under significant level 0.05  
(b) For testing equal proportion, the conclusion is not reject under significant level 0.05  
(c) More information is needed to draw a conclusion  
(d) The rejection region for testing the independence is \( \chi^2 < \chi^2_{\alpha} \)  
(e) None of them

25. For independent random samples from two Normal populations:

\[ n_1 = 6 \quad s_1 = 2.1 ; \quad n_2 = 9 \quad s_1 = 2.2 ; \]

Which of the tests you would use in testing hypotheses about \( \mu_1 - \mu_2 \)?

(a) Z-test  
(b) t-test with pooling  
(c) conservative t-test without pooling  
(d) matched pair t-test  
(e) None of them

26. Soccer has become a popular sport, especially among grade school children. Eighty second-grade girls and seventy-five second-grade boys were asked whether they play on a youth soccer team. The results are given in the table.

<table>
<thead>
<tr>
<th>Play</th>
<th>Don’t Play</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>34</td>
</tr>
<tr>
<td>Girls</td>
<td>59</td>
</tr>
</tbody>
</table>
For testing the probabilities are equal for all the population in each response category which one is correct about the d.f. of the $\chi^2$ statistic?

(a) 1  (b) 2  (c) 3  (d) 4  (e) None of them

27. The toxicity of two combinations of an insecticide and a herbicide was studied in an experiment. Two batches of fruit flies were randomly assigned to these treatments and the following results were recorded.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Number of dead flies</th>
<th>Number of alive flies</th>
<th>Batch Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>43</td>
<td>37</td>
<td>80</td>
</tr>
<tr>
<td>B</td>
<td>52</td>
<td>18</td>
<td>70</td>
</tr>
</tbody>
</table>

Let $p_A$ and $p_B$ denote the probabilities of death of fruit flies under the application of treatments $A$ and $B$, respectively. Test $H_0 : p_A = p_B$ versus $H_1 : p_A < p_B$ at $\alpha = 0.025$. Which of the following is correct

(a) If $\chi^2$ test is used, then the rejection region is $\chi^2 < 5.02$, the null hypothesis is rejected.
(b) If $\chi^2$ test is used, then the rejection region is $\chi^2 > 5.02$, the null hypothesis is not rejected.
(c) If $Z$ test is used, then the rejection region is $Z > 1.96$, the null hypothesis is not rejected.
(d) If $Z$ test is used, then the rejection region is $Z < 1.96$, the null hypothesis is rejected.
(e) None of them.

28. A random sample of 16 observations provided $\bar{x} = 70$ and $s = 4$. Test $H_0 : \sigma = 3.5$ versus $H_1 : \sigma > 3.5$ at $\alpha = 0.05$. Which of the following is correct?

(a) $Z$ test can be used to test the null hypothesis since sample size is large enough ($> 15$).
(b) $T$ test can be used to test the null hypothesis with normality assumption of the sample.
(c) $\chi^2$ test can be used to test the null hypothesis with normality assumption.
(d) $\chi^2$ test can be used to test the null hypothesis without normality assumption.
(e) None of them.
29. The following summary is recorded for independent samples from two populations.

<table>
<thead>
<tr>
<th></th>
<th>Sample 1</th>
<th>Sample 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>(n_1)</td>
<td>90</td>
<td>100</td>
</tr>
<tr>
<td>(\bar{x}_1)</td>
<td>76.4</td>
<td>81.2</td>
</tr>
<tr>
<td>(s_1)</td>
<td>8.2</td>
<td>7.6</td>
</tr>
</tbody>
</table>

Which of the following is a 95\% confidence interval for \(\mu_1 - \mu_2\)?
(a) \((-4.8 - t_{0.025, df=188} \times 1.146, -4.8 + t_{0.025, df=188} \times 1.146)\).
(b) \((-7.046, -2.554)\).
(c) \((-4.8 - t_{0.05, df=188} \times 1.146, -4.8 + t_{0.05, df=188} \times 1.146)\).
(d) \((-6.685, -2.915)\).
(e) None of them.

30. According to a survey, 50 males out of 600 and 28 females out of 500 report that they usually drive 10 or more miles per hour over the speed limit in the city. Let \(p_1\) denote the proportion of male speeders and \(p_2\) denote that of female speeders. For test \(H_0: p_1 = p_2\) versus \(p_1 > p_2\), which of the following is correct about the P-value?
(a) P-value is between 0.025 and 0.05.
(b) P-value is between 0.05 and 0.10.
(c) P-value is between 0.01 and 0.025.
(d) P-value is between 0.005 and 0.01.
(e) None of them.

31. A survey was conducted by sampling 515 persons who were questioned regarding union membership and attitude toward decreased national spending on social welfare programs. The cross-tabulated frequency counts are presented.

<table>
<thead>
<tr>
<th></th>
<th>Support</th>
<th>Indifferent</th>
<th>Opposed</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Union</td>
<td>65</td>
<td>59</td>
<td>48</td>
<td>172</td>
</tr>
<tr>
<td>Nonunion</td>
<td>118</td>
<td>135</td>
<td>90</td>
<td>343</td>
</tr>
<tr>
<td>Total</td>
<td>183</td>
<td>194</td>
<td>262</td>
<td>515</td>
</tr>
</tbody>
</table>

We define population parameters as follows.
What is \( H_0 \) or \( H_1 \) for the test of independence? (Hint: Ch 11.5)

(a) \( H_1: p_{D1} = p_{Dp1} \quad \text{AND} \quad p_{D2} = p_{Dp2} \quad \text{AND} \quad p_{D3} = p_{Dp3} \quad \text{AND} \quad p_{R1} = p_{Rp1} \quad \text{AND} \quad p_{R2} = p_{Rp2} \quad \text{AND} \quad p_{R3} = p_{Rp3} \)

(b) \( H_0: p_{D1} = p_{Dp1} \quad \text{AND} \quad p_{D2} = p_{Dp2} \quad \text{AND} \quad p_{D3} = p_{Dp3} \quad \text{AND} \quad p_{R1} = p_{Rp1} \quad \text{AND} \quad p_{R2} = p_{Rp2} \quad \text{AND} \quad p_{R3} = p_{Rp3} \)

(c) \( H_1: p_{D1} = p_{Dp1} \quad \text{OR} \quad p_{D2} = p_{Dp2} \quad \text{OR} \quad p_{D3} = p_{Dp3} \quad \text{OR} \quad p_{R1} = p_{Rp1} \quad \text{OR} \quad p_{R2} = p_{Rp2} \quad \text{OR} \quad p_{R3} = p_{Rp3} \)

(d) \( H_0: p_{D1} = p_{Dp1} \quad \text{OR} \quad p_{D2} = p_{Dp2} \quad \text{OR} \quad p_{D3} = p_{Dp3} \quad \text{OR} \quad p_{R1} = p_{Rp1} \quad \text{OR} \quad p_{R2} = p_{Rp2} \quad \text{OR} \quad p_{R3} = p_{Rp3} \)

(e) None of them.

32. To compare the effectiveness of four drugs in relieving postoperative pain, an experiment was done by randomly assigning 111 surgical patients to the drug under study. Recorded here are the number of patients assigned to each drug and the number of patients who were free of pain for a period of five hours.

<table>
<thead>
<tr>
<th>Free of Pain</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drug 1</td>
<td>11</td>
</tr>
<tr>
<td>Drug 2</td>
<td>28</td>
</tr>
<tr>
<td>Drug 3</td>
<td>21</td>
</tr>
</tbody>
</table>

Let \( p_1 \) denote the proportion of patients that are free of pain using drug 1; \( p_2 \) denote the proportion of patients that are free of pain using drug 2; \( p_3 \) denote the proportion of patients that are free of pain using drug 3. To test \( H_0: p_1 = p_2 = p_3 \), which of the following is correct?

(a) \( Z \) test can be used, and the rejection region is \( Z > 1.96 \) if the level of significance is 0.025.

(b) \( Z \) test can be used, and the rejection region is \( |Z| > 1.96 \) if the level of significance is 0.05.

(c) \( \chi^2 \) test can be used, and the test statistic equals to 0.153.
(d) $\chi^2$ test can be used, and the test statistic equals to 0.045.
(e) None of them.

Model: $Y_i = \beta_0 + \beta_1 x_i + e_i, \quad i = 1, \cdots, n.,$ where $e_i \sim N(0, \sigma^2)$.

<table>
<thead>
<tr>
<th>Position (x)</th>
<th>Height (y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ($x_1$)</td>
<td>2 ($y_1$)</td>
</tr>
<tr>
<td>3 ($x_2$)</td>
<td>0 ($y_2$)</td>
</tr>
<tr>
<td>-1 ($x_3$)</td>
<td>1 ($y_3$)</td>
</tr>
</tbody>
</table>

33. What is $\hat{\beta}_0$ (Least Squars Estimate)?
   (a) 0.2308 (b) 1.2308 (c) -1.2308 (d) 0 (e) None of them

34. What is the $T_{obs}$ of $H_0 : \beta_1 = 0$, $H_1 : \beta_1 \neq 0$ test?
   (a) 2.024 (b) -2.024 (c) 1.039 (d) -1.039 (e) None of them

35. What is $\hat{\sigma}^2$?
   (a) $25/26$ (b) $\sqrt{25/26}$ (c) $-25/26$ (d) $-\sqrt{25/26}$ (e) None of them

36. Define $\hat{y}_3 = \hat{\beta}_0 + x_3 \cdot \hat{\beta}_1$. What is $\hat{y}_3$?
   (a) 0.2307 (b) -0.808 (c) 0.577 (d) 1.577 (e) None of them

37. Define $\hat{e}_1 = y_1 - \hat{y}_1$. What is $\hat{e}_1$?
   (a) -0.192 (b) 0.192 (c) -0.769 (d) 0.769 (e) None of them

38. Choose the output of the R command:
   > qnorm(0.95, mean=-2, sd=1)
   (a) 1.64+2 (b) 1.64 (c) 1.64-2 (d) 1.96+2 (e) None of them
   Hint: $z_\alpha \equiv$ upper $\alpha$ quantile: $z_{0.05} = 1.64$, $z_{0.025} = 1.96$
39. Choose the output of the R command:
   \> qnorm(0.95, mean=4, sd=5)
   (a) -1.64+4  (b) -1.96+4  (c) 4  (d) -1.64-1.96+4  (e) None of them
   Hint: \( z_\alpha \equiv \) upper \( \alpha \) quantile: \( z_{0.05} = 1.64, z_{0.025} = 1.96 \)

40. Which output is the same as \( z_{\alpha/4} \)?
   (a) qnorm( \( \alpha/4 \), mean=0, sd=1) 
   (b) qnorm( 1 - \( \alpha/4 \), mean=0, sd=1) 
   (c) pnorm( 1 - \( \alpha/0.5 \), mean=0, sd=1) 
   (d) pnorm( 1 - \( \alpha/8 \), mean=0, sd=1) 
   (e) None of them