LESSON 8-4

Practice B

Significance of Experimental Results

Use the information below to answer the questions.

1. A school is testing whether a new curriculum is successful in raising final exam scores. The data show the scores of the classes that were taught with the new curriculum (the test group) and the classes that continued to use the old curriculum (the control group).

<table>
<thead>
<tr>
<th>Control</th>
<th>72</th>
<th>87</th>
<th>72</th>
<th>78</th>
<th>90</th>
<th>64</th>
<th>77</th>
<th>82</th>
<th>70</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test</td>
<td>97</td>
<td>88</td>
<td>82</td>
<td>90</td>
<td>79</td>
<td>83</td>
<td>99</td>
<td>82</td>
<td>86</td>
</tr>
</tbody>
</table>

a. State the null hypothesis for the experiment.

b. Compare the results for the control group and the test group. Is there enough evidence to reject the null hypothesis?

2. A school claims that a new curriculum will increase the average test score to 90. In a random sample of 25 students that were taught with the new curriculum, the average test score was 88, with a standard deviation of 4 points. Find the $z$-value, rounded to the nearest tenth.

a. $z$-score: ______________

b. Is there enough evidence to reject the school’s claim about test scores?

3. A company manufactures rubber balls. The company claims its product bounces twice as high as its leading competitor’s product. In an experiment, bounce height is measured in feet. The results of seven trials are shown in the table.

<table>
<thead>
<tr>
<th>Company</th>
<th>3</th>
<th>3.5</th>
<th>3.2</th>
<th>3.6</th>
<th>2.5</th>
<th>4</th>
<th>3.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competitor</td>
<td>6</td>
<td>6.7</td>
<td>4.5</td>
<td>2.1</td>
<td>3.6</td>
<td>5.5</td>
<td>5.1</td>
</tr>
</tbody>
</table>

State the null hypothesis for the experiment.

4. The company claims that its new rubber ball will raise the average bounce height to 5 feet. In a new trial, 9 balls were tested, and the average bounce was 4.5 feet with a standard deviation of 1 foot. Find the $z$-value.

a. $z$-score: ______________

b. Is there enough evidence to reject the claim about bounce height?
2. The real estate developer gathers data without controlling the individuals or applying a treatment. The situation is an example of an observational study.

3. Treatment: applying heat to flower seeds. Treatment group: 50 randomly chosen seeds that were heated. Control group: another 50 randomly chosen seeds left at room temperature.

4. Treatment: using a fuel additive. Treatment group: volunteers that use fuel with the additive. Control group: volunteers that use plain fuel.

5. A
6. G

Reading Strategy
1. survey
2. experiment
3. observational study
4. experiment
5. survey
6. the group of subscribers who ordered in the normal way
7. the group of products that went on sale at the normal time

8-4 SIGNIFICANCE OF EXPERIMENTAL RESULTS

Practice A
1. The light bulbs will burn out in the same amount of time.

2 a. It will take the same amount of time for the water to boil whether salt is added or not.

b. There is a very slight difference between the two groups that is likely to be caused by chance, so the null hypothesis cannot be rejected based on this experiment.

3 a. 3

b. Yes; |3| > 1.96, so the null hypothesis should be rejected.

c. It is not likely that Carly's claim is true because |3| > 1.96 and so the null hypothesis was rejected with 95% certainty.

Practice B
1 a. The test scores will be the same for both groups.

b. There is a large difference between the two groups that is unlikely to be caused by chance. The school should reject the null hypothesis because the new curriculum is working to increase test scores at the school.

2 a. –2.5

b. Because the absolute value of z is 2.5, which is greater than 1.96, there is enough evidence to reject the null hypothesis with 95% certainty.

3. The bounce heights will be the same for each company’s product.

4. a. –1.5

b. Because the absolute value of z is 1.5, which is less than 1.96, there is not enough evidence to reject the null hypothesis with 95% certainty.

Practice C
1 a. Any difference in the gas mileage between the groups was caused by chance.

b.

c. There is a difference between the two groups but it is not great enough to rule out the possibility that it was caused by chance, so the null hypothesis cannot be rejected based on this experiment.