The Effect of Incubation Temperature and Salinity on Seed Germination*:*A Two Factor Design of Experiment

Table 1

Factors used in Experiment

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Incubation Temperature (˚ C) | | | Salinity (percent solution) | | |
| (-) | Standard | (+) | (-) | Standard | (+) |
| 35.5 | 37 | 38.5 | 0.125% | 0.800% | 1.500% |

Table 2

Data for Three Runs

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| First Run | | | Second Run | | | Third Run | | |
| Order | Trial | Result (amount germinated) | Order | Trial | Result (amount germinated) | Order | Trial | Result (amount germinated) |
| 1 | Standard | 20 | 1 | Standard | 40 | 1 | Standard | 25 |
|  | (+,+) | 31 |  | (+,+) | 30 |  | (+,+) | 5 |
|  | (-,-) | 7 |  | (-,-) | 7 |  | (-,-) | 37 |
| 4 | Standard | 27 | 4 | Standard | 42 | 4 | Standard | 34 |
|  | (+,-) | 18 |  | (+,-) | 34 |  | (+,-) | 28 |
|  | (-,+) | 42 |  | (-,+) | 14 |  | (-,+) | 11 |
| 7 | Standard | 25 | 7 | Standard | 30 | 7 | Standard | 29 |

Table 3

Average Number of Seeds Germinated Data

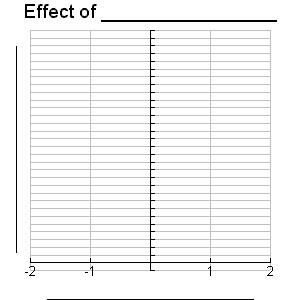
|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| trials | | First  Run | Second Run | Third  Run | Averages |
|  |  |
| (+) | (+) |  |  |  |  |
| (-) | (-) |  |  |  |  |
| (+) | (-) |  |  |  |  |
| (-) | (+) |  |  |  |  |

Use table three to find the averages of highs and lows.

What is the grand average of this data set?

Use the tables below to find each of the three effect values now. Be sure to label the figures and tables.

Table 4  
Effect of



|  |  |
| --- | --- |
|  | |
| - | + |
|  |  |
|  |  |
|  |  |

Figure 1. Effect of \_\_\_\_\_\_\_\_\_\_\_

Table 5

Effect of

|  |  |
| --- | --- |
|  | |
| - | + |
|  |  |
|  |  |
|  |  |

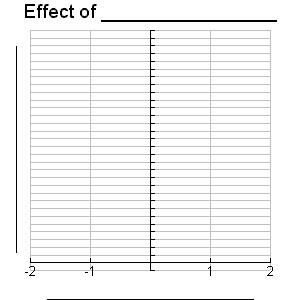


Figure 2. Effect of \_\_\_\_\_\_\_\_\_\_\_

Table 6

Interaction Effect.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | | | [image] | |
| (-) | (+) |
|
|  | Solid Segment | (+) |  |  |
|
| Dotted Segment | (-) |  |  |
|

Figure 3. Interaction effect of \_\_\_\_\_\_\_\_\_

Now that you have found the three effects, take a look at the standards. Write them in the chart below.

Table 7

Data of Standards

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Standard (Number of Seeds Germinated) | | | | | | | | |
|  |  |  |  |  |  |  |  |  |

What is the range of standards? What is the range of the entire data set?

Create a scatterplot of the standards below. Be sure to block by run. Look for trends. Discuss any that you see. Don’t forget your labels.

Figure 4. Scatterplot of Standards

Now it is time for your dot plot of effects. Plot the three effect values. Include a legend. Set up fences for double the range of standards. Which effect(s) are deemed “statistically significant?”

Figure 5. Dot Plot of Effects

Last but not least, it is time to create your two equations.

Write the prediction equation below. Be sure to include your grand average.

Show a check of your work. Use the low, high average (- , +)

Make an interpolated prediction of (0.5, -0.5). Be sure to include an explanation of what these values mean.

Finally, what is the parsimonious prediction equation? Write it below.

Do the same interpolated prediction (0.5, -0.5) using only parsimonious prediction equation. Write it below. Compare and contrast the two predictions