**Homework 1**

Shruti Natekar & Nikta Farsai

**Exercise 14.1**

1. Factors:
2. Water temperatures (OF)
3. Hardener
4. Factor levels:
5. Water temperatures (OF):
6. 200
7. 175
8. Hardener:
9. H1
10. H2
11. H3
12. Blocks: 2 manufacturing plants from pipes were randomly selected
13. Experimental units: Each pipe
14. Measurement unit: Five locations on each pipe
15. Replications: factor level 1 x factor level 2 = 2x3=6, 24/6=4 replications
16. Covariates: Compressive strength of pipes
17. Treatment: 2 Water temperature levels \* 3 Hardener levels = 6 Total treatments

(H1, 200°F) / (H2, 175°F)/(H3/200°F)/(H3/175°F)/(H2/200°F)/(H1/175°F)

**Exercise 14.7:**

1. Factors:
2. Temperature
3. Seafood
4. Factor levels:
5. Temperature (0,5,100C)
6. Seafood (Oysters, Mussels)
7. Blocks: packages of oysters and packages of mussels from which random samples are taken
8. Experimental unit: Storage units at different temperature levels
9. Measurement unit: oysters and mussels from each package from all storage units
10. Replications: 3 replications
11. Covariates: Bacterial count measured before treatment application
12. Treatments: 3 levels of temperature \* 2 levels of seafood = 6 treatment combinations

(0 °C, Mussels), (0 °C/Oysters), (5 °C/Mussels)

(5 °C/Oysters), (10 °C/Mussels), (10°C/Oysters)

**Exercise 14.5 (Page 934)**

1. H0: µa = µb = µc = µd

Ha: At least one of the 4 incentive plan means differ from the rest.

1. P-value = 0.118 > α = 0.05, hence, we fail to reject the null hypothesis and conclude that there is no significant evidence that the mean output associated with the four incentive plans is different.
2. There are insufficient evidences to reject the null hypothesis and to show that at least one of the mean output associated with the four incentive plans is different, so Fisher’s LSD procedure cannot be applied.

**Exercise 14.16 (Page 940)**

Given:

t=4, ɑ = 0.05, power = 0.9 (90%) and D = 30, 𝞂^ = 12.25

Φ = sqrt (rD2/2tσ^2)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **r** | **V1 = t-1** | **V2 = t(r-1)** | **Φ = 0.866\*sqrt(r)** | **power** |
| 5 | 3 | 16 | 1.936 | 0.88 |
| 6 | 3 | 20 | 2.12 | 0.91 |

Therefore, approximately **6 individuals** are needed for each software program to declare a difference in the average completion times asɑ = 0.05 with a power of 0.9 (90%).