

Use Excel to solve the following problems

### **Problem 1**

A researcher wants to determine whether a hypnotherapy program can help to reduce cigarette consumption amongst long-term smokers, defined as people that have been regular smokers for more than 10 years. Therefore, the dependent variable was "cigarette consumption", measured in terms of the average number of cigarettes smoked, and the independent variable was "time", which consisted of two related groups: "before" and "after" the hypnotherapy program.

To carry out the experiment, the researcher recruited a sample of smokers. All of these participants took part in the intervention, which was a 6-week hypnotherapy program designed to help them quit smoking. The cigarette consumption of the participants was first recorded "before" the intervention (i.e., pre-intervention) and then for a second time "after" the intervention (i.e., post-intervention). This is typically known as a "pre-test post-test" study design.

Pre	26	18	17	23	27	40	38	34	35	25	27	42	33	19
Post	21	27	30	12	8	23	16	13	14	22	5	7	34	0

Test whether there was a statistically significant difference in cigarette consumption before and after the hypnotherapy program.

### **Problem 2**

The following data are two independent random samples from two independent populations  $A \sim (\mu_A, \sigma_1^2)$  and  $B \sim (\mu_B, \sigma_2^2)$ , respectively.

A: 48 39 42 52 40 48 52 52 54 48

B: 50 48 42 40 43 48 50 46 38 38

- (i) Test the claim that there is a significant difference between  $\mu_A$  and  $\mu_B$ .
- (ii) Find 95% confidence interval of the difference  $\mu_B - \mu_A$ .

### **Problem 3**

he following data is from a study on frame delay time of the access points in a wireless network. Frame delay times in milliseconds were recorded for 4 access points (AP1, AP2, AP3, AP4).

- (i) Write down a descriptive statistics report showing the mean and standard derivation of the times. The compare between the variation of the delay time at the access points based on the coefficient of variation.
- (ii) Compare between the different delay time means based on the different cities

City	AP1	AP2	AP3	AP4
1	93	85	100	96
1	120	45	75	58
2	65	80	65	95
1	105	28	40	90
2	115	75	73	65
2	82	70	65	80
1	99	65	50	85
2	87	55	30	95
1	100	50	45	82
2	90	40	50	99
2	78	75	45	85
2	95	60	55	87
1	93	45	55	96
1	88	45	60	78
1	110	48	61	75

**Problem 4**

A study was made by a retail merchant to determine the relation between weekly advertising expenditures and sales.

Advertising cost / week S.R	Sales (in 1000 S.R)
400	385
200	400
250	395
200	365
300	475
500	440
400	490
200	420
500	560
400	525
250	480
500	510

Analyze this data using the linear regression approach.

**Problem 5**

A signal is transmitted over a noisy channel. It is known that the signal will be correctly received with probability 0.85. Five signals are independently sent. Write the commands and results to calculate

- i. The probability that no signal is incorrectly received.
- ii. The probability that all 3 signals are incorrectly received.
- iii. The probability that at least 1 signal is correctly received.