LAB. METEOROLOGICAL DATA ANALYSIS .... FOURTH STAGE

(The second Semester)

Department of Atmospheric Sciences

2022 – 2023

Lecturers :

Assist. Prof. Zahra salah , L. Ruaa mazin

L. Luma Mahdi , L. Salwa salman,L.Farah haseb

Preparing by: L. Ruaa mazin , L. Luma Mahdi

((Fifth Lecture))

The Statistical Test of a Hypothesis:

It is a set of statistical tests that researchers use to make a decision About whether a Null hypothesis is acceptable or not, this is done using a test function Appropriate stats. There is a wide range of statistical tests The choice of hypothesis test depends on Data structure, data distribution, and variable, e.g. (a new treatment might be successful, or a relationship) between the number of sunspots and the amount of precipitation.

There are two types of hypotheses used in hypothesis testing:

1- The null hypothesis

is the hypothesis To be tested is denoted by the symbol (**Ho)** including the objective of the test, And accepting it means not rejecting the results of the sample, it is in the form of an equation or an equation:

* The arithmetic mean of the sample = the arithmetic mean of the population that is, there is no difference between the mean and the sample.

For example / if the null hypothesis to be tested is the average income of the individual in One of the regions is \$200 per month. The imposition is written in symbols as follows:

H0: μ=200

2- Alternative Hypothesis : It is the hypothesis that is accepted in the case of reject the null hypothesis .

(**Ho**) It is symbolized by the symbol (**H1**) Take the shape is not equal :

alternative hypothesis (Ha) (**The arithmetic mean of the sample is ≠ the arithmetic mean of the population**)

H1: μ > 200 Right side test H1: μ <200 left side test

H1: μ ≠200 Not equal to the test of both sides.

*There is more than one type of test such as (**T-tests, Z-tests, and ANOVA tests**) These tests assume that the data have a normal distribution and are called tests parametric.

Z-test :

A statistical test used to compare two populations (the sample and the population). When the mean is The arithmetic is known and the standard deviation coefficient is also known.

$$Z = \frac{(\bar{x} - \mu)}{(\sigma/\sqrt{n})}$$

Where: $\bar{x}$ = The arithmetic mean of the sample.

μ = the arithmetic mean of the population.

$\sigma = standard\ deviation$.

Note: When the number of samples is more than 30, we use a test z .

For example: A school principal finds that the students' IQ level is higher than the students of the rest of the school's 40 students (as a sample) arithmetic mean of 112 students proved that their IQ is higher than the rest Schools arithmetic mean of the population is 100 and standard deviation is 15 and error rate =0.05.

Solue:

1- we extract values of **z** Calculated from the equation below:

$$Z = \frac{(\bar{x} - \mu)}{(\sigma/\sqrt{n})}$$

$$= \frac{(112 - 100)}{(15/\sqrt{40})} = \qquad \textbf{The value of Zcalculated}$$

2-Calculate the value of Z in the statistical table:

*error rate=0.05, we find the accuracy rate =0.95

* We divide the percentage of accuracy or the value of accuracy by 2 (0.95/2= 0.4750).

* find the value of z Tabular by finding the location of the value   (0.475).

* We add the value from the table (row + column) appears, which **equals 1.96**, which represents the tabular value of Z as shown in the statistical table

* *We compare the calculated z value with the tabular z, ***If the calculated value is greater, we reject the null hypothesis and choose the alternative hypothesis. If the values are equal, we accept the null hypothesis (the null hypothesis.***

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0190	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2969	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3513	0.3554	0.3577	0.3529	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990
3.1	0.4990	0.4991	0.4991	0.4991	0.4992	0.4992	0.4992	0.4992	0.4993	0.4993
3.2	0.4993	0.4993	0.4994	0.4994	0.4994	0.4994	0.4994	0.4995	0.4995	0.4995
3.3	0.4995	0.4995	0.4995	0.4996	0.4996	0.4996	0.4996	0.4996	0.4996	0.4997
3.4	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4998

H.W// A random sample of 49 people was selected from among the country's members. If the arithmetic mean weekly income of individuals for this sample is $75, the community standard deviation of individuals' income is $14 and the arithmetic mean weekly income of this country is 72. Do you accept the null hypothesis? If you know that the tabular value of z is (1.96) .