**DAILY ASSESSMENT FORMAT**

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| **Course:** | **Basic statistics** | **USN:** | **4al17ec031** |
| **Topic:** | **Week7** | **Semester & Section:** | **6th & ‘A’** |
| **GitHub Repository:** | **Divyashri-course** |  |  |

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| SESSION DETAILS |
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| Report:  A statistical hypothesis is an expectation about a population. Usually it is formulated as a claim that a population parameter takes a particular value or falls within a specific range of values. On the basis of information from a sample we assess if a hypothesis makes sense or not. The significance test is, just like the confidence interval, a method of inferential statistics. Each significance test is based on two hypotheses: the null hypothesis and the alternative hypothesis. If you do a significance test, you assume that the null hypothesis is true unless your data provide strong evidence against it.  if we conduct a significance test we assume that the population value we’re interested in has a certain value and assess if it is likely that the sample we have collected actually comes from a population with this assumed parameter value. Important concepts are test statistic, P-value, significance level and rejection region. We’ll also discuss the difference between one- and two-tailed tests.  If the null hypothesis is true and you don’t reject it, or if the null hypothesis is false and you do reject it, you make right decisions. But if the null hypothesis is true and you decide to reject it or if the null hypothesis is false and you decide not to reject it you make wrong decisions. The first wrong decision is what we call a Type I error and the second one is what we call a Type II error. If you decrease the probability of making a Type I error, you increase the probability of making a Type II error and vice versa. In the first video in this section we'll discuss these types of error and we'll also introduce the concept of power. The power of a test is the probability of rejecting the null hypothesis given that it is false.  The probability of making a Type II error is what we call beta. It's complicated to compute beta. It depends on various factors, such as the value of alpha, the sample size, and the true value of the parameter. For that reason, we won't compute the value of beta here, but it is important that you realize that, when we try to decrease the probability of one type of error, the probability of the other type increases.  When the null hypothesis is false, and you are conducting a test, you want the power of the test to be high. The power of a test is the probability of rejecting the null hypothesis, given that it is false, or, in other words, the power of a test equals 1 minus the probability of a Type II error. That's the same as 1 minus beta.  a null hypothesis that the mean whale shark length in the population equals eight meters. The first one is that the population mean differs from eight meters. The second one is that it is larger than eigth meters. And the third one is that the population mean is smaller than eight meters. In all three cases, we set the significance level alpha at 0.10. First, we'll have to check our assumptions. As I've said before, the selection of whale sharks can be understood as a simple random sample  The value of the test statistic is the same for all three tests. After all, the sample mean and the null hypothesis mean do not differ between tests. This is the formula we use, that leads to the following computation. 8.3 minus 8, divided by 3.4 divided by the square root of 258. That equals about 1.42. Now, let's start with the first alternative hypothesis, this one. It claims that the population mean differs from eight. First we draw the relevant sampling distribution and show the null hypothesis value.  The final alternative hypothesis is that the population mean is smaller than eight. In this case we do a left tail test that looks like this. We have a cumulative probability of 0.10 at the left side of the distribution.  the critical value which corresponds to this rejection region is -1.29. Now our test statistic which is 1.42, is still a value more extreme than our critical value. However, it is located at the other side of the distribution.  important to always draw the sampling distribution. Otherwise, you might well fail to notice that the test statistic is located on the other side of the distribution than your critical value.  The final alternative hypothesis is that the population mean is smaller than 8. In this case we do a  left-tailed test. That looks like this. We have a cumulative probability of 0.10 at the left side of the  distribution. This is exactly the mirror image of our previous right-tailed test. So the critical value  which corresponds to this rejection region is minus 1.29. Now our test statistic (which is 1.42) is a  value more extreme than our critical value. However, it is located at the other side of the  distribution. This means that it is not located in the rejection region and that we therefore don’t  reject our null hypothesis. We cannot conclude that the population mean is smaller than 8. |