Statistical Significance

Given a significance level, we can often use statistical tables to decide whether to reject or not reject the null hypothesis.

Going back to the LDL example in testing $H_0 : \mu = 0$ versus $H_a : \mu > 0$, we obtained an observed value of the standardized test statistic $t^* = 4.337$, and the knowledge that if H_0 is true, the sampling distribution of the test statistic is t_9.

$\approx$

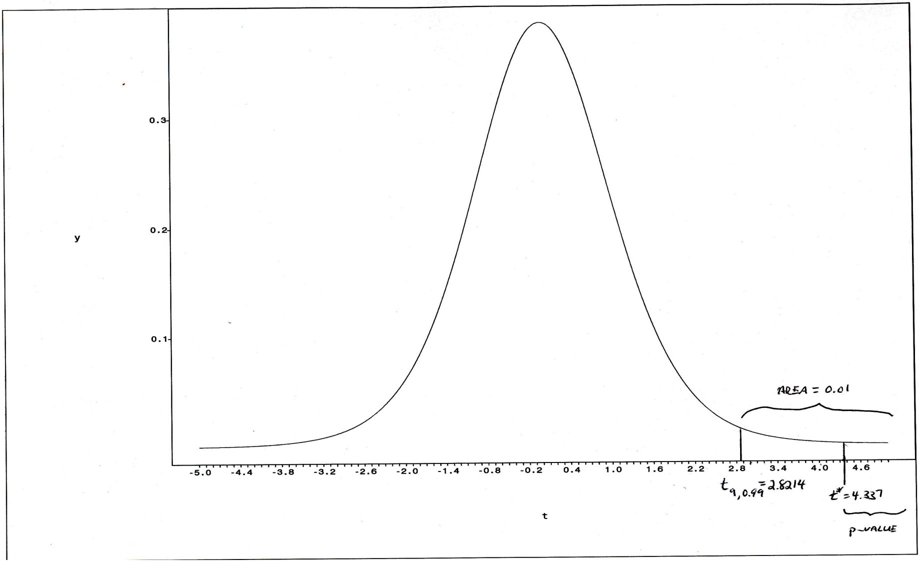
Statistical Significance

Suppose we want to conduct the test at the 0.01 level of significance.

Using the t table, we see that $t_{9,0.99} = 2.8214$. Since $t^* = 4.337 > 2.8214$, we know the p-value is less than 0.01 and the action will be to reject H_0 in favor of H_a.

The following illustrates.

$\approx$



y
0.3
0.2
0.1
-5.0
-4.4
-3.8
-3.2
-2.6
-2.0
-1.4
-0.8
-0.2
0.4
1.0
1.6
2.2
2.8
3.4
4.0
4.6
t
AREA = 0.01
$t_{9,0.99} = 2.8214$
$t^* = 4.337$
p-VALUE

Statistical Significance

In fact, the table tells us more:

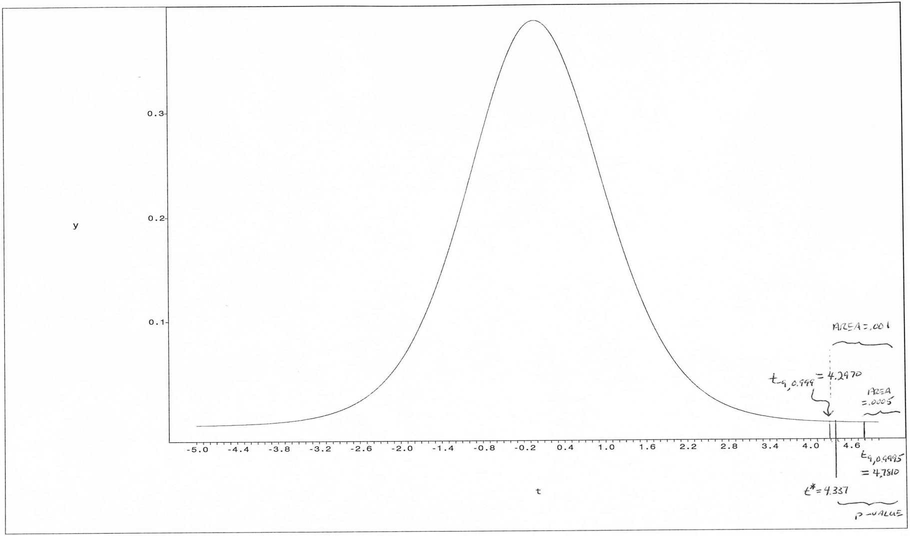
Since

$$t_{9,0.999} = 4.2970 < t^* < 4.7810 = t_{9,0.9995},$$

we know that the p-value is between 0.0005 and 0.001. (recall that it is really 9.4×10^{-4}).

The following illustrates.

$\approx$



y
0.3
0.2
0.1
-5.0
-4.4
-3.8
-3.2
-2.6
-2.0
-1.4
-0.8
-0.2
0.4
1.0
1.6
2.2
2.8
3.4
4.0
4.6
t
AREA =.001
$t_{9,0.999} = 4.2970$
AREA =.0005
$t_{9,0.9995} = 4.7810$
$t^* = 4.337$
P-VALUE