Biology 4605/7220 Name ___________Key__________
Quiz 9b 13 November 2007 (from 18 October 1995)

An agronomist expects that, on average, high bush blueberry production will be negatively associated with cloud cover. The agronomist obtains records of cloud cover and berry production. The observed correlation is r = −0.40 based on 15 years. Test whether correlation is significantly <u>less</u> than zero (one-tailed test).

For small sample sizes the statistic t_s is normally distributed.

$t_S = (z-0)\ (n-3)^{1/2}$ where $z = (0.5)\ln\left(\frac{1+r}{1-r}\right)$

Thus we can use the normal distribution to calculate p-values for t_S . Here is the cumulative distribution function for negative values of t_S, at values of r ranging from 0 to −0.9

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MTB > set into c1
DATA> 0 -.1 -.2 -.3 -.4 -.5 -.6 -.7 -.8 -.9
DATA> end
MTB > let c2 = 0.5*log((1+c1)/(1-c1))*sqrt(15-3)

MTB > cdf c2;
SUBC> normal 0 1.
     0.0000    0.5000
    -0.3476    0.3641
    -0.7023    0.2413
    -1.0722    0.1418
    -1.4676    0.0711
    -1.9029    0.0285
    -2.4011    0.0082
    -3.0044    0.0013
    -3.8057    0.0001
    -5.0999    0.0000
```

column 1 of the output is the normal score (z) for t_S values of r ranging from 0 to −0.9
column 2 of the output is the p-value corresponding to several negative values of z and hence the t_S statistic.

What is the probability of obtaining a normal score of −1.9 or less? __0.0285__

The normal distribution is symmetrical.
What is the probability of obtaining a normal score of 1.9 or more? __0.0285__

What is the value of t_S when r = 0 ? _ t_S =0 when r = 0_

Be sure to state null and alternative hypotheses concerning r,
H_A: r < 0 or equivalently H_A: t_s < 0
H_o: r ≥ 0 or equivalently H_o: t_s ≥ 0

state your significance criterion, _____α = 5% (or α = 1% or α = 10%)__

calculate the t-statistic for the observed correlation (r = −0.40), −1.4676

and declare a decision. Correlation not significant at 5%
r = −0.40, p = 0.071, n = 15