STAT 110A
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Name:_____

Quiz 7

Bricks. A purchaser of bricks suspects that the quality of the bricks is deteriorating. From past experience, the mean crushing strength of such bricks is 350 pounds, with a standard deviation of 20 pounds. A sample of 100 bricks yielded a mean of 345 pounds. The purchaser believes that standard deviation is the same. Test the hypothesis that the mean quality has not changed against the alternative that it was deteriorated. Choose $\alpha = .05$. (*Hint:* Assume one sided alternative.)

Practice Problems

Soybeans. According to advertisements, a strain of soybeans planted on soil prepared with a specified fertilizer treatment has a mean yield of 500 bushels per acre. Fifty farmers, who belong to a cooperative, plant the soybeans. Each uses a 40-acre plot and records the mean yield per acre. The mean and variance for the sample of 50 farms are $\bar{x} = 485$ and $s^2 = 10,045$.

Test whether the data provide sufficient evidence to indicate that the mean yield for the soybeans is different from the advertised.

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 Testing H_0: mu= 500  v.s. H_1: mu != 500 .
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 :-) Do not reject H_0.
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p-value= 0.295 is larger than alpha= 0.05 .
t-statistic= -1.058 .
The rejection region cutpoint is (+/-) 1.677 .
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Great white shark. One of the most feared predators in the ocean is the great white shark *Carcharodon carcharias*. Although it is known that the white shark grows to a mean length of 21 feet (record: 39 feet), a marine biologist believes that the great white sharks off the Bermuda coast grow much longer due to unusual feeding habits. To test this claim, a number of full-grown great white sharks are captured off the Bermuda coast, measured and then set free. However, because the capture of sharks is difficult, costly, and very dangerous, only three are sampled. Their lengths are 24, 20, 22 feet.

1. Do the data provide sufficient evidence to support marine biologist's claim? Use $\alpha = 0.1$.

2. What assumptions must be made in order to carry out the test?

Public Health. A manager of public health services in an area downwind of a nuclear test site wants to test the hypothesis that the mean amount of radiation in the form of Strontium-90 in the bone marrow (measured in picocuries) for citizens who live downwind of the site does exceed that of citizens who live upwind from the site. It is known that "upwinders" have a mean level of Strontium-90 of 1 picocurie. Measurements of Strontium-90 radiation for a sample of $n = 16$ citizens who live downwind of the site was taken, giving $\bar{X} = 3$. The population standard deviation is $\sigma = 4$.

a) Test the (research, alternative) hypothesis that downwinders have a higher Strontium-90 level than upwinders. Assume normality and use a significance level of $\alpha = 0.05$.

(i) State H_0 and H_1

(ii) State the appropriate test statistic

(iii) Determine the critical region of the test

(iv) State your decision

(v) What would constitute a type-II error in this setup? *Describe in less than 20 words.*