ISE 2211 • Exam IV • 18 October 2019 /14 NAME SOLUTION

Joe Tritschler's buddy Alan Zonker is, among other things, a world-class mold-maker. Mold-making is some of the highest-precision machining work there is. In fact, if you've ever eaten Kraft-brand Cheez Whiz®, then you have experienced AZ's genius, because he makes the molds for the rubber nozzles that squirt Cheez Whiz® into the jars. (He also builds top-fuel racing motorcycles and makes ultra-precision assemblies for a nuclear power plant. AZ is a bad dude.) The target diameter for a Cheez Whiz® nozzle is 32.6 mm. In a 25-cavity mold, the mean measured diameter was found to be 32.65 mm with a standard deviation of 232 μm. Test the following hypotheses on Cheez Whiz® nozzle mean diameter using the fixed level of significance approach at $\alpha = 0.05$. Roughly sketch the appropriate distribution, showing your test statistic, critical value(s), and critical region(s). Don't forget to clearly state your final conclusion regarding the null hypothesis.

H_0: $\mu = 32.6$ mm

H_0: $\mu \neq 32.6$ mm

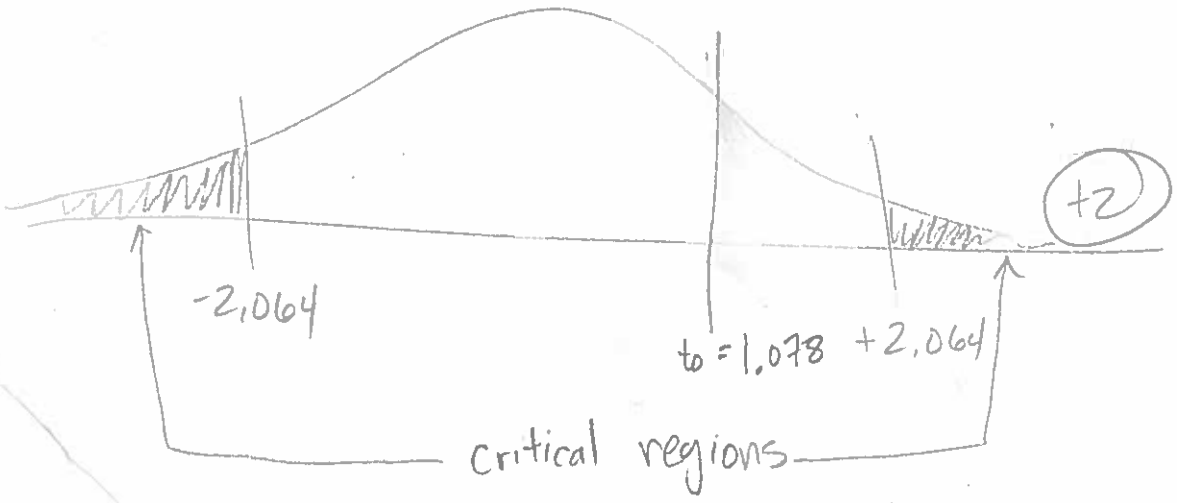
$n < 30$; use t-distribution (+1)

$$t_0 = \frac{\bar{x} - \mu_0}{s/\sqrt{n}} = \frac{32.65 - 32.6}{0.232/\sqrt{25}}$$

$t_0 = 1.078$ (+1)

critical values: $\pm t_{\alpha/2, n-1}$

$= \pm t_{.025, 24} = \pm 2.064$ (+1)



(+2)

$t_0 \not> + t_{\alpha/2, n-1}$ (+1)

fail to reject H_0 (+1)

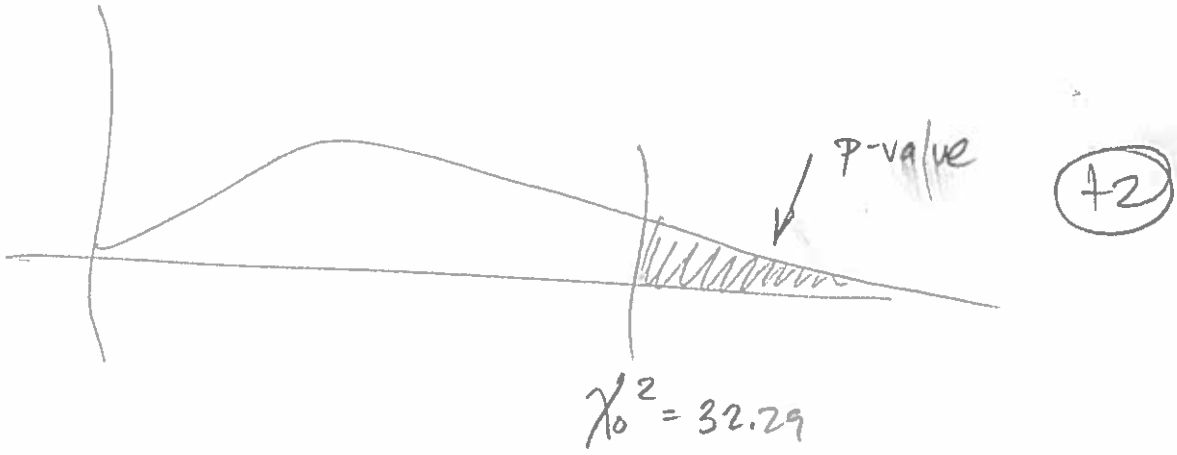
Now test the following hypotheses on standard deviation using the *p*-value approach. Roughly sketch the appropriate distribution, showing your test statistic and region(s) corresponding to the *p*-value. State your final conclusion with respect to a significance level of $\alpha = 0.05$.

H_0: $\sigma = 200$ µm

H_1: $\sigma > 200$ µm

$$\chi_0^2 = \frac{(n-1)s^2}{\sigma_0^2} = \frac{24 \cdot 232^2}{200^2}$$

$$\chi_0^2 = 32.29 \quad (+1)$$



(+2)

$\chi^2_{.500,24} = 23.34$

$\chi^2_{.100,24} = 33.20$ } (+1)

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$.1 < P < .5$ (+1)

$P \not< \alpha = 0.05$ (+1)

fail to reject H_0 (+1)