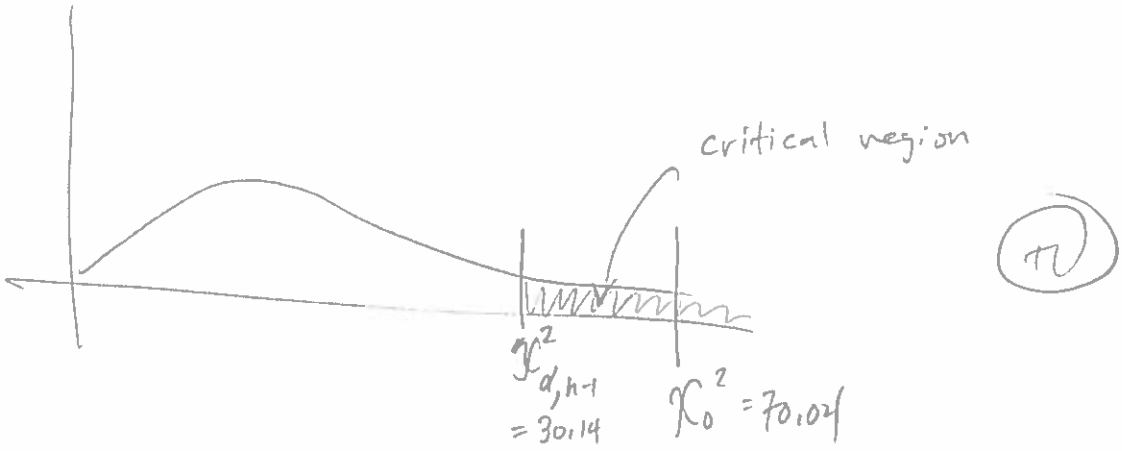
ISE 2211 • Exam IV • 20 October 2018 NAME SOLUTION

1) Joe Tritschler recently investigated the standard deviation in thickness of twenty 1x4s after he suspected they weren't planed correctly by the lumberyard. The population standard deviation is supposed to be no more than 1/16", but the sample standard deviation was determined to be 0.12". Test the following hypotheses on population standard deviation using the fixed significance level approach @ $\alpha = 0.05$. Sketch the corresponding distribution curve, indicating the critical region(s) and your test statistic value. State whether you would reject or fail to reject the null hypothesis.

H_0: $\sigma = 1/16"$
H_1: $\sigma > 1/16"$

$$\chi_0^2 = \frac{(n-1)s^2}{\sigma_0^2} = \frac{19 \cdot .12^2}{(1/16)^2} = \underline{70.04} \quad (+1)$$

Critical value: $\chi^2_{\alpha,n-1} = \chi^2_{.05,19} = \underline{30.14}$ [Table]
(+1) (+1)



(+1)

$\chi_0^2 > \chi^2_{\alpha,n-1}$

∴ reject H_0 (+1)

2) Out of a random sample of 328 Gardetto's®-brand snack mix pieces, Joe Tritschler found that 72 were rye chips. The manufacturer claims that the proportion of rye chips is 25%. (Joe Tritschler is tired of these snack manufacturers constantly perpetrating insidious conspiracies against him and he wants answers!) Test the following hypotheses on the population proportion of rye chips in Gardetto's®-brand snack mix at the $\alpha = 0.05$ level of significance. Sketch the corresponding distribution curve, indicating the critical region(s) and your test statistic value. State whether you would reject or fail to reject the null hypothesis.

H_0: $p = 25\%$

H_1: $p \neq 25\%$

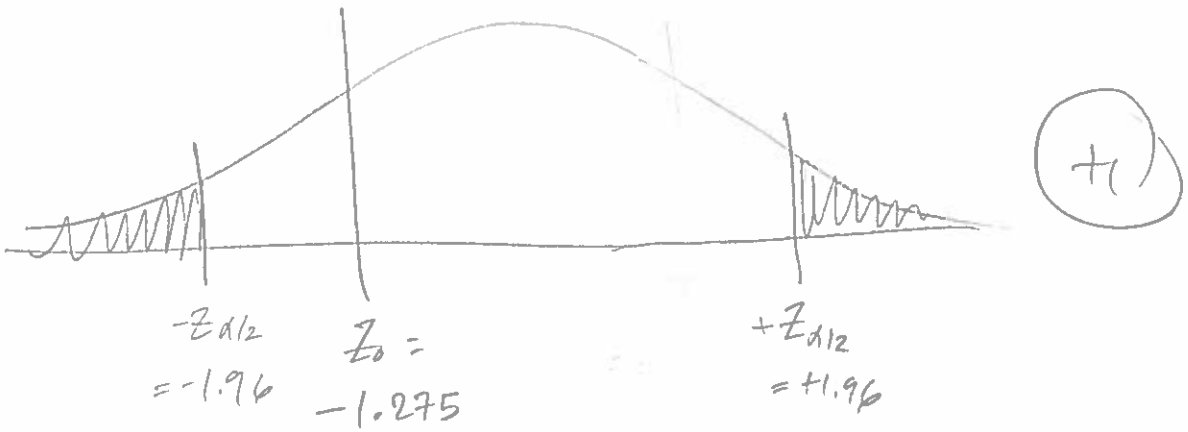
$$Z_0 = \frac{X - np_0}{\sqrt{np_0(1-p_0)}} = \frac{72 - 328 \cdot .25}{\sqrt{328 \cdot .25(.75)}}$$

$$Z_0 = -1.275 \quad (+1)$$

critical value: $\pm Z_{\alpha/2}$

$= \pm Z_{.025}$

$= \pm 1.96$ (+1)



(+1)

$Z_0 \not< -Z_{\alpha/2}$

fail to reject H_0 (+1)

3) Here's some data nobody cares about.

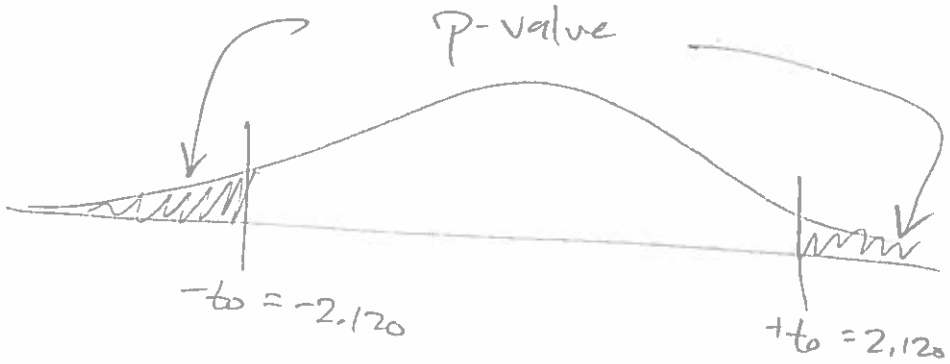
$\bar{x} = 37.94$
$s = 4.928$
$n = 29$
σ = ? (unknown)

Test the following hypotheses using the *p*-value approach at $\alpha = 0.05$:
H_0: $\mu = 36.00$
H_1: $\mu \neq 36.00$

Sketch the distribution, indicating your test statistic and the region(s) corresponding to the *p*-value.

$$t_0 = \frac{\bar{x} - \mu_0}{s/\sqrt{n}} = \frac{37.94 - 36}{4.928/\sqrt{29}} = 2.120$$

+1



+1

from Table, 28 degrees of freedom:

$$P(t > 2.048) = 0.025$$
$$P(t > 2.467) = 0.01$$

+1

$$2.048 < t_0 < 2.467$$

$$.01 < \frac{P}{2} < 0.025$$

$$.02 < P < 0.05$$

+1

$P < \alpha$;
∴ reject H_0

+1