ISE 2211 • Exam IV • 15 October 2021 — 20 pts. — NAME SOLUTION

On the first statistics exam, we looked at data regarding HRV, or Heart Rate Variability, in milliseconds for Joe Tritschler's esteemed colleague who had a "breakthrough" case of Covid-19 a couple months ago. Here is the data, for which we already computed sample parameters of $\bar{x}$ = 39.64 ms and s^2 = 66.55 $(ms)^2$.

Day	Date	HRV	Notes
W	7/28	33	
R	7/29	43	
F	7/30	43	
S	7/31	39	
U	8/1	23	Low number likely reflects excessive alcohol consumption the previous night
M	8/2	47	
T	8/3	31	
W	8/4	37	Presentation of COVID symptoms
R	8/5	40	Confirmed positive COVID test
F	8/6	31	
S	8/7	39	
U	8/8	52	Reported feeling "loads better"
M	8/9	48	
T	8/10	49	

Said colleague says her "normal" baseline value of HRV is 36 ms. Test the following hypotheses on the mean value of HRV using the fixed-α approach at α = 0.05. Sketch the appropriate distribution showing critical values, critical regions, and the test statistic.

H_0: μ = 36 ms

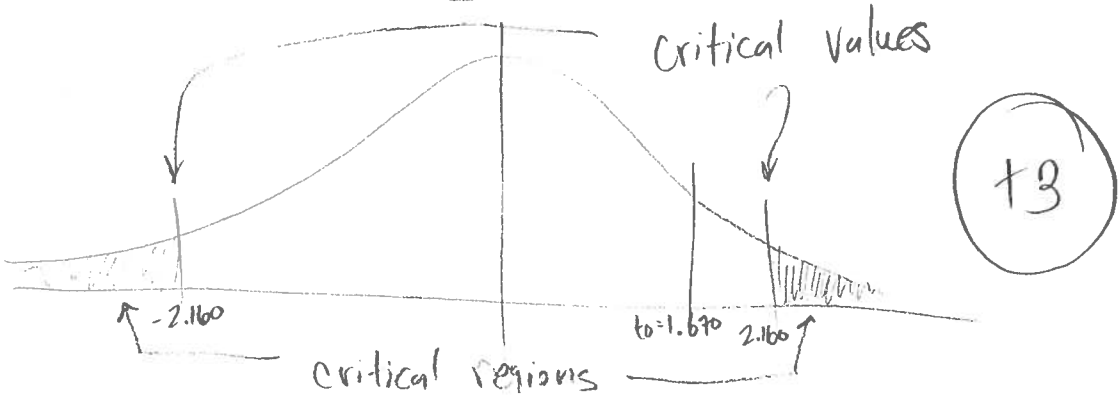
H_0: $\mu \neq$ 36 ms

$n < 30$; need T-distribution

$$t_0 = \frac{\bar{x} - \mu_0}{s/\sqrt{n}} = \frac{39.64 - 36}{\sqrt{66.55/14}} = 1.670$$ (+2)

critical values: $\pm t_{.05/2,\ 14-1} = \pm 2.160$ (+2)

$t_0 \not> +t_{crit.}$; ∴ fail to reject H_0 (+2)



+3

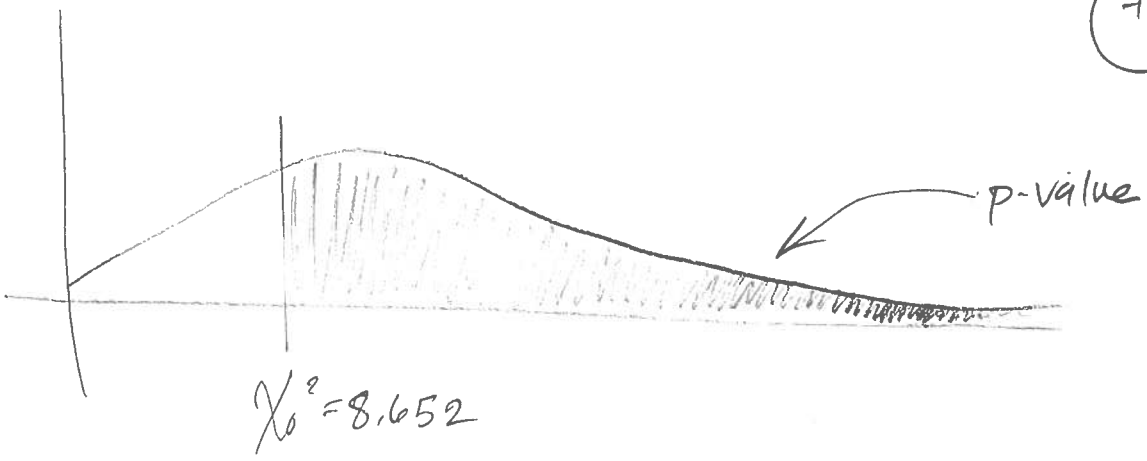
Test the following hypotheses on the standard deviation of HRV using the *p*-value approach. Sketch the appropriate distribution showing the test statistic and region corresponding to the *p*-value. State your final conclusion with respect to a significance level of $\alpha = 0.05$.

H_0: $\sigma = 10$ ms

H_0: $\sigma \geq 10$ ms

$$\chi_0^2 = \frac{(14-1)\,66.55}{10^2} = 8.652$$

+2



+3

from table:

$$\chi^2_{.900,13} = 7.04$$
$$\chi^2_{.500,13} = 12.34$$

} +2

$\therefore$ $0.5 < \text{p-value} < 0.9$ +2

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

Massively fail to reject H_0! +1