Classwork #19

(Do both ways)

1. p 412, #9.64
   Critical value approach

Step 1
   H₀: μ ≤ 45 min
   H₁: μ > 45 min right tail

Step 2
   If unknown use t dist

Step 3
   For α = 0.01
   df = n - 1 = 20 - 1 = 19
   do not reject H₀

Step 4
   \[ S_x = \frac{s}{\sqrt{n}} = \frac{3}{\sqrt{20}} = 0.67082039 \]

   test stat \[ t = \frac{\bar{x} - \mu}{S_x} = \frac{49.50 - 45}{0.67082039} = 6.708 \]

Step 5
   Reject H₀
   Conclude mean drying time is greater than 45 min
   (at 1% signif)

b) Type I error occurs if mean drying time actually is less
   than 45 min, but we wrongly reject this. Probab. of making
   a Type I error is \( \alpha = 0.01 \)
Classwork #19

1. p412 #9.64
   p-value approach

Step 1 ∃ Same
Step 2 ∃ calculate test stat t
Step 3 t = 6.708 (calculated on other sheet)

area = p-value

\[ t = 6.708 \quad df = 19 \]

Off chart, but we can see at df = 19 \[ t = 3.579 \] corresponds to area .001

so p-value \( < .001 \)

\[ \alpha \geq p-value \quad \text{at most} \quad .001 \]

reject H0. Conclude mean drying time greater than 45 min (at 1% level of significance)
Classwork #19

2. \( p = 0.23 \neq 0.92 \)
   
   **p-value approach**
   
   \( H_0: \ p = 0.093 \)
   
   \( H_1: \ p \neq 0.093 \)
   
   **two-tail**
   
   **Step 2**
   
   \( np = 880(0.093) = 81.84 \)
   
   \( nq = 880(0.907) = 768.16 \)
   
   Use normal dist.
   
   **Step 3**
   
   Calculate test stat \( z \)
   
   \[ z = \frac{\hat{p} - p}{\sqrt{\frac{pq}{n}}} = \frac{0.69 - 0.093}{0.009979048} = 6.9 \]
   
   **Step 4**
   
   Calculate test stat \( z \)
   
   \( z = \frac{\hat{p} - p}{\sqrt{\frac{pq}{n}}} = \frac{0.69 - 0.093}{0.009979048} = 6.9 \)
   
   Test stat \( z = -1.49 \)
   
   Shaded region = p-value
   
   \( z = -1.49 \)
   
   Look up \( z \) = 1.49 get area = 0.0681
   
   \( p-value = q(0.0681) = 0.1362 \)
   
   \( 0.1362 > 0.10 \)
   
   \( p-value > \alpha \)
   
   Do not reject \( H_0 \)
   
   At 10% signif. proportion is not different from 9.3%.
Classwork # 19

3. p 371 # 8.99
   $\bar{x} = $ 2640
   $\sigma = $ 578

   a) point test for
   $m = \bar{x} = $ 2640

   b) 97% conf int for mean
   $\bar{x} \pm z \frac{\sigma}{\sqrt{n}}$
   $2640 \pm (2.17)(57.8)$
   $\text{At } 97\% \text{ confidence, the mean amt owed on all credit card}
   \text{accts at this bank is in this range}$

4. p 372 # 8.104
   $n = 25\quad \bar{x} = $ 685\quad s = $ 74

   99% conf int for mean $m$
   $\bar{x} \pm s\sqrt{x}$
   $685 \pm 2.797(14.8)$
   $\text{At } 99\% \text{ conf. the mean prem for all life insurance}
   \text{policies is in this interval}$