WARM UP

1) A school superintendent must make a decision whether or not to cancel school because of a threatening snow storm. What would the results be of Type I and Type II errors for the null hypothesis: The weather will remain dry?

a) Type I error: don't cancel school, but the snow storm hits.
Type II error: weather remains dry, but school is needlessly canceled.

b) Type I error: weather remains dry, but school is needlessly canceled.
Type II error: don't cancel school, but the snow storm hits.

c) Type I error: cancel school, and the storm hits.
Type II error: don't cancel school, and weather remains dry.

d) Type I error: don't cancel school, and snow storm hits.
Type II error: don't cancel school, and weather remains dry.

e) Type I error: don't cancel school, but the snow storm hits.
Type II error: cancel school, and the storm hits.

2) Choosing a smaller level of significance, that is, a smaller α-risk, results in

a) a lower risk of Type II error and lower power.
b) a lower risk of Type II error and higher power.
c) a higher risk of Type II error and lower power.
d) a higher risk of Type II error and higher power.
e) no change in risk of Type II error or in power.

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WARM UP Ch. 9 Review Day

Study the solution details for part a. Then do parts b, c, d, and e.

The Environmental Protection Agency has determined that safe drinking water should have an average pH of 7 moles per liter. You are testing water from a new source, and take 30 vials of water. Water is unsafe if it deviates too far from 7 moles per liter in either direction. The mean pH level in your sample is 6.4 moles per liter, which is slightly acidic. The standard deviation of the sample is 0.5 moles per liter.

(a) Do the data provide convincing evidence at the $\alpha = 0.05$ level that the true mean pH of water from this source differs from 7 moles per liter?

STATE

$H_0: \mu = 7$

$H_a: \mu \neq 7$

μ = true mean pH level (moles/liter) of the water.

$\alpha = 0.05$

$\bar{x} = 6.4$ moles/liter ← evidence for H_a

PLAN One sample t test for μ

Random - random sample of 30 vials. ✓

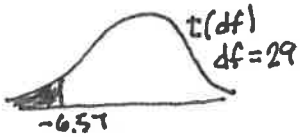
10% - not needed because of the infinite sources of water

Normal/LargeSample: $n = 30 \geq 30$ CLT ✓

DO $\bar{x} = 6.4$ $s_x = 0.5$ (from GDC)

Standard statistic = $\frac{\text{Stat} - \text{Parameter}}{SD}$

$$t = \frac{\bar{x} - \mu}{\frac{s_x}{\sqrt{n}}} = \frac{6.4 - 7}{\frac{.5}{\sqrt{30}}} = -6.57$$



$df = 30 - 1 = 29$

p-value $2 \cdot t_{cdf}[-1000, -6.57, 29] \approx 0$ (lower, upper, df)

or TABLE A $P(t < -6.57) = 2(.0005) = 0.001$

CONCLUDE

Because the p-value of approximately 0 $< \alpha = 0.05$, we reject H_0.

∴ There is convincing evidence that the true mean pH level for this water source differs from 7.

↓

AP Stats Chapter 9 Formula Study Sheet

esson	9.2 – Significance Test for a Proportion	9.3 – Significance Test for a Mean
Symbol for statistic (sample)		
Symbol for parameter (population)		
Name the procedure		
RANDOM condition		
10% condition		
NORMAL condition		
Formula for mean of the sampling distribution		
Formula for standard deviation of the sampling distribution		
General formula for test statistic		
Specific formula for test statistic		
Picture		
How to find P-value		

If using techonology to check "DO"

4 STEP PROCESS

STATE: Parameter, statistic, hypotheses, and significance level.

PLAN: Name the appropriate inference method and check conditions.

DO: If the conditions are met, perform the calculations.

General formula, specific formula, work, test statistic, picture, P-value.

CONCLUDE: Make a conclusion about the hypotheses in the context of the problem.

Chapter 9 FRAPPY!

Directions: Show all your work. Indicate clearly the methods you use, because you will be scored on the correctness of your methods as well as on the accuracy and completeness of your results and explanations.

Anne reads that the average price of regular gas in her state is $4.06 per gallon. To see if the average price of gas is different in her city, she selects 10 gas stations at random and records the price per gallon for regular gas at each station. The data, along with the sample mean and standard deviation, are listed in the table below.

Station	1	2	3	4	5	6	7	8	9	10
Price ($)	4.13	4.01	4.09	4.05	3.97	3.99	4.05	3.98	4.09	4.02

Mean = $4.038 Standard deviation = $0.0533

Do the data provide convincing evidence that the average price of gas in Anne's city is different from $4.06 per gallon?