TOPIC: CHI-SQUARE INDEPENDENCE TEST

Independence Test

◆ Recall: Two variables are **Independent** if neither one affects the other.

► An **Independence Test** is a G.O.F. Test where "claimed" dist. = E's of the ___ variables (assumed *independent*).

EXAMPLE

Using the following data of the heights of students at a local high school, you find $\chi^2 = 3.32$. Test if height & grade are independent using $\alpha = 0.05$.

	5'1-5'6	5'7-6'0	6'1-6'6
9th	$O = 40$ $E = 34.43$	$O = 27$ $E = 29.17$	$O = 10$ $E = 12.91$
10th	$O = 32$ $E = 37.12$	$O = 34$ $E = 31.45$	$O = 17$ $E = 13.92$

Recall: Goodness of Fit Test | **New: Independence Test**

1) Hypothesis

H_0: Obs. freq's match claimed dist.

H_a: Obs. freq's DO NOT match claimed dist.

H_0: Variables are _____.

H_a: Variables are _____.

2) Test Stat

$E = \frac{n}{k}$ *(claimed prob's SAME)*

$E = np$ *(claimed prob's DIFF)*

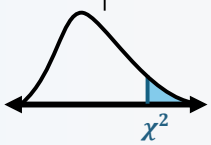
$\chi^2 = \sum \frac{(O-E)^2}{E}$

$E = \frac{row\ total \cdot col\ total}{Grand\ Total}$

$\chi^2 = 3.32$

3) P-value

$df = k - 1$



$df = (r-1)(c-1)$

P-value = Area "beyond" χ^2

df = ___

r = # of rows

c = # of columns

P-value = _____

4) Conclusion

Because P-value **[< | >]** α, we **[REJECT | FAIL TO REJECT]** H_0.

There is **[ENOUGH | NOT ENOUGH]** evidence that the variables are dependent.

Criteria

Random Samples? ☐

Observed freq. for each category? ☐

$E \geq 5$ for each category? ☐

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EXAMPLE

The table below shows the results from a drug trial for a new ADHD medication. Using $\alpha = 0.01$, test if symptom improvement is independent of whether a participant received the placebo.

		Group		
		Placebo	**Non-Placebo**	**Total**
Symptoms	**Improved**	18	37	**55**
	Not Improved	30	15	**45**
	Total	**48**	**52**	**100**

Random Samples? ☐

Observed freq. for each category? ☐

$E \geq 5$ for each category? ☐

H_0:

H_a:

$\chi^2 =$

$r = \#rows =$ ___ $\quad c = \#col's =$ ___ $\quad df =$ _____ $=$ ___

P-value = _____

Because P-value **[< | >]** α, we **[REJECT | FAIL TO REJECT]** H_0. There is **[ENOUGH | NOT ENOUGH]** evidence…

Recall

$$E = \frac{row\ total \cdot col\ total}{Grand\ Total}$$

$$\chi^2 = \sum \frac{(O-E)^2}{E}$$

$$df = (r-1)(c-1)$$

(Independence Test)