"90 subjects diagnosed for depression enlisted for comparison of treatments for depression. Subjects were randomly divided into three groups 30 ea and given pills to take over 3 months." Desired to test H0: rate of return to depression same for all three types of pill vs H1: not all same.

STT200 4-27-09a

observed table

	Placebo	Saint John's wort	Posrex	
Depression returned	24	22	14	60
No sign of depression	6	8	16	30
fixed totals	30	30	30	90

H0: RATE DEPR SAME FOR ALL 3 GROUPS H1: NOT ALL SAME

"expected" table under H0

	Placebo	Saint John's wort	Posrex	
Depression returned	30 60 / 90 = 20	30 60/90=20	20	60
No sign of depression	10	10	10	30
fixed totals	30	30	30	90

CT RT/RT

Chi square statistic = $(24 - 30\ 60 / 90)^2 / (30\ 60 / 90) + \ldots\ldots + = 0.8 + 0.2 + 1.8 + 1.6 + 0.4 + 3.6^*$

$= 8.4$ ✓ with df = (R-1)(C-1) = (2-1)(3-1) = 2.

THIS 3.6 LARGE CONTRIB OF "NO SIGN POSREX"

P-value = Pr(chi square with 2 df > 8.4) = 0.015.

	0.025		0.01	
2 df	7.378	(8.4 is in between)	9.210	so P-value is between 0.025 and 0.01.

NOTE: LOOK AT $(16 - 10)/\sqrt{10}$ POSITIVE "LARGE"

Binomial: p = probability of "success," q = 1-p.

– Ch 19 RECALL –

17-21. IF more than 20% of emergency responders require additional training THEN additional money will have to be found.

17. Suggest H0 and H1 for a z-test to address the issue.

If set it up H_0: $p = .2$ NEED TRAINING

H_1: $p > .2$ " "

IN CONTROL $\alpha = P(\text{REJ } H_0 \mid H_0 \text{ IS TRUE})$

eg If we can live w/ a 10% chance of REJ H_0 WHEN it is true (ie FALSE POSITIVE)

ORDINARY TERMS: IF $p \leq .2$ ($p = .2$ STANDS IN) TAKE WE'LL HAVE 10% OF MAKING MISTAKE OF REJ H_0.

HOW? TAKE SAMPLE. CALC χ^2 STAT, DF, P-VALUE.

If P-VALUE $\leq .10$ then REJECT H_0

HOW TO USE P-VALUE TO TEST W/ $\alpha = 0.10$

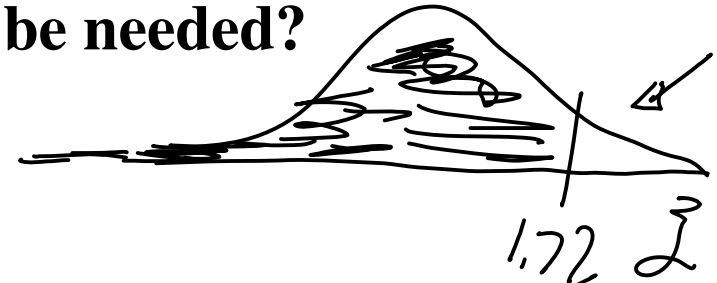
18. A random sample of 200 emergency responders finds 50 who require the training. Calculate an appropriate z-test statistic.

χ^2 STAT **= 1.77**

$\hat{p} = \frac{50}{200} = .25$ $p_0 = .2$ $q_0 = .8$

ALL ABOUT p (Z-TEST) STAT $\frac{\hat{p} - p_0}{\sqrt{p_0 q_0 / n}} = \frac{.25 - .2}{\sqrt{.2 \cdot .8 / 200}}$

19. Determine the P-value. Does it seem that additional money will be needed?



P-VALUE SINCE $H_1: p > .2$ { EVIDENCE AGAINST H_0 IS TO RIGHT

z	0.07
1.7	P(Z < z) = 0.9616

ans. P-value ~ P(Z > 1.77) = 1 - 0.9616 = 0.0384. ← PVALUE PSIG OBSERVED LEVEL

NOT HIGHLY SIGNIFICANT .04 NOT ALL THAT SMALL.

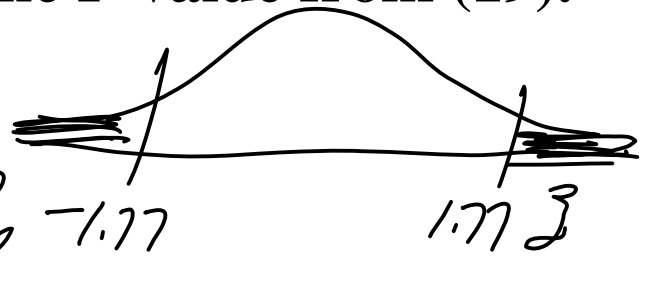
20. If instead H1: "p is not .2" is this a one-sided or two-sided test?

H_1 .2 H_1 2-SIDED TEST SINCE H_1 FALLS BOTH SIDES OF H_0.

21. For H1: "p is not .2" determine the P-value from (19).

ans. 2 (0.0384) = 0.0768

TWICE P-VALUE FOR 1-SIDED TEST



22. For a test of H0: p = 0.2 versus H1: "p is not 0.2" we may employ chi square goodness of fit. Give the table of exp and obs counts for such a test if a sample of 200 finds 50 (as above).

	require training	do not require training	
exp	.2 200 = 40	160	200
obs	50	150	200

$H_0: p = .2$

$H_1: p \neq .2$

std score

$DF = C - 1 = 2 - 1 = 1$

23. Refer to (22). Determine the chi square statistic for the test.

$\sum_{2 \text{ CELLS}} (OBS - EXP)^2 / EXP = (50-40)^2/40 + \frac{(150-160)^2}{160} = 3.125$

24. Refer to (22). Determine the P-value.

Pr(chi square 1 df > 3.125) ~ .0771 COMPUTER. CLOSE

DF	.10	3.125	.05
1	2.71		3.84

Compare P-value with that of two-sided z-test (which was 0.0768).

25. Meta Analysis. Each of two experimenters independently finds

chi sq = 9.54 df = 6

chi sq = 14.33 df = 9

Test H0: both null hypotheses are correct.

H_0: BOTH EXP 1 EXP 2 HAVE CORRECT MODEL.

Y G B R SUM

.38 .1 .06 REST

MIN

SITE

χ^2 TEST DF = 4-1 = 3.

SOMETIMES POSSIBLY < 5 RULE OF THUMB.

χ^2 STAT = 9.54 + 14.33

DF = 6 + 9 = 15

& MAYBE GET exp ≥ 5 IN ALL CELLS.

WORKS SINCE χ^2 (FIRST) = DIST $Z_1^2 + \cdots + Z_6^2$ INDEP

χ^2 (SECOND) = " $Z_1^2 + \cdots + Z_9^2$