"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.

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

"expected" table under H0

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

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

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

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.

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

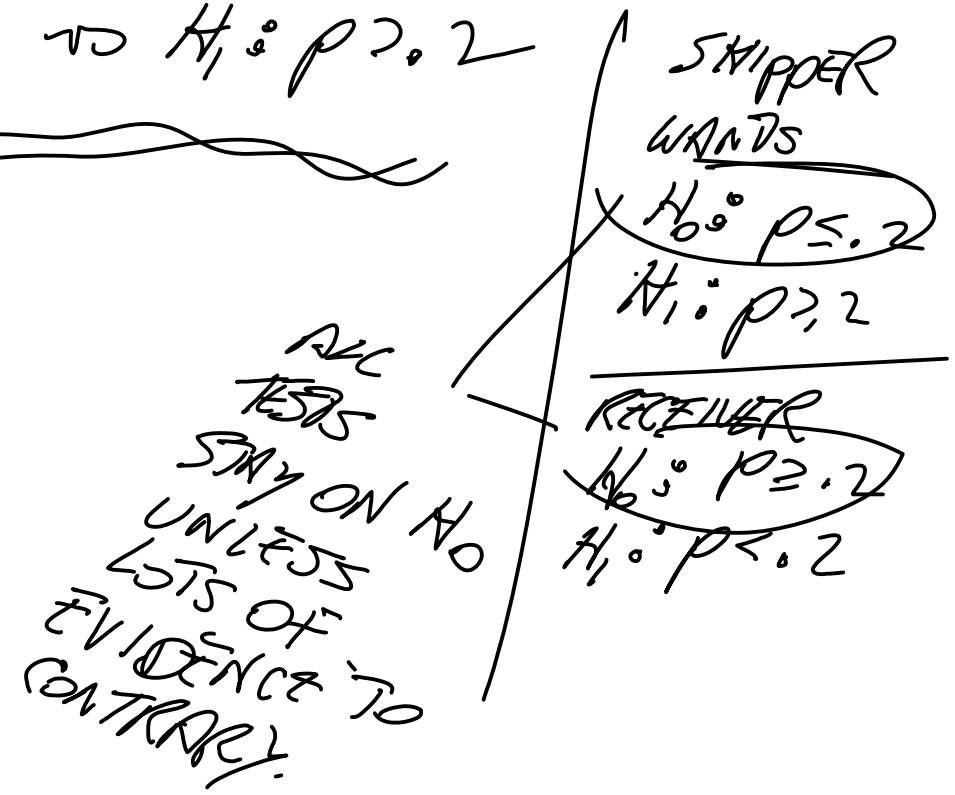
CH 19 –

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.

SAMPLE n RESPONDERS TO SEE IF THERE IS EVIDENCE $p > .2$ (p = POPN FRACTION NEEDING TRAINING).

COULD TEST $H_0: p = p_0 = .2$ VS $H_1: p > .2$



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

$H_0: p \le .2$
$H_1: p > .2$

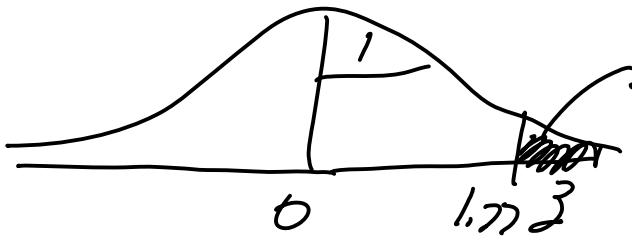
$\hat{p} = \frac{50}{200} = .25$

FIND Z-TEST

$$\frac{\hat{p} - p_0}{\sqrt{p_0 q_0 / n}} = \frac{.25 - .2}{\sqrt{.2 \cdot .8 / 200}} = 1.77$$

$q_0 = 1 - p_0 = .8$
$p_0 = .2$

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



P-VALUE

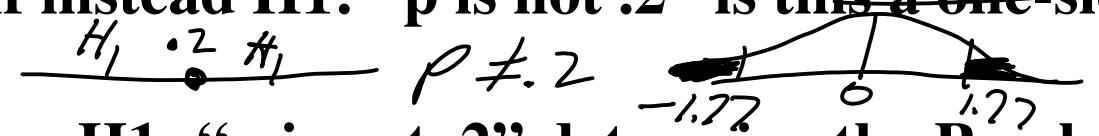
z	0.07
1.7	P(Z < z) = 0.9616

.0384

ans. P-value ~ P(Z > 1.77) = 1 - 0.9616 = 0.0384.

IF THIS IS ~0 REJ H_0 (SO IF WISH $\alpha = .01$ THEN REJ IF $.0384 < .01$ NO)

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



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

ans. 2 (0.0384) = 0.0768 TOO BIG FAIL TO REJ H_0

TWICE — P-VAL OF 1 SIDED (2 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).

$H_0: p = .2$ $\quad n = 200$

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

GOODNESS OF FIT

$C = 2$

$DF = 2 - 1 = 1$

std score

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

$$\chi^2_{STAT} = \sum_{2\ CELLS} (OBS - exp)^2/exp = \frac{(50-40)^2}{40} + \frac{(150-160)^2}{160} = 3.125$$

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

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

χ^2 TEST $\quad$ DF 1

2. ANS

DF 1 $\quad$ 3.125 $\quad$ BETWEEN TWO P VALUES $\quad$ 3.125

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

Z-TEST $\quad$ BINOM P