Homework 2

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Problem 1 We use runs up and down test here. Note that we are going to delete one 45.3 since the difference is 0. The total runs is $V = 17$.

Since $n \geq= 25$, asymptotic normal distribution is preferred.

Here $n = 29, E_{H_0}(V) = (2n-1)/3, Var_{H_0}(V) = (16n-29)/90$.

Test statistic
$$\frac{R + .5 - E_{H_0}(V)}{\sqrt{Var_{H_0}(V)}} = -0.68 > -1.96 = z_{0.025}.$$
Therefore, we cannot reject the null hypothesis.

Problem 2

	depressed	not depressed	total
M	10 (13.5)	30(27)	40
F	20(16.5)	30 (33)	50
total	30	60	90

In the parathesis is the theoretical number.

We perform Pearson χ^2 test, where df equals to 1.

$$\chi^2 = \frac{(10-13.5)^2}{13.5} + \frac{(30-27)^2}{27} + \frac{(20-16.5)^2}{16.5} + \frac{(30-33)^2}{33} = 2.24,$$

Using Table B in textbook, $\chi_1^2 = 3.84$. So we do NOT reject the null hypothesis.

Problem 3

$H_0 : p_A = .34, p_B = .15, p_{AB} = .23, p_O = .28$

Once again, Pearson χ^2 test is applied, where $df = 4 - 1 = 3$,

$$\chi^2 = \frac{(12 - 34)^2}{34} + \frac{(56 - 15)^2}{15} + \frac{(2 - 23)^2}{23} + \frac{(30 - 28)^2}{28} = 145.6,$$

Using Table B in textbook, $\chi_1^2 = 3.84$. So we reject the null hypothesis.