

Assignment 10: Due Dec 9, 2019

**** Please print your assignment and submit it to the lecturer on the due date, thanks for your cooperation.**

1. Diastolic blood-pressure measurements were collected at home in a community-wide screening program of 14,736 adults ages 30-69. The people in the study were each screened in the home, with two measurements taken during one visit. A frequency distribution of the mean diastolic blood pressure is given in the table below in 10-mm Hg intervals. We would like to assume these measurements came from an underlying normal distribution because standard methods of statistical inference could then be applied on these data as presented in this text. Assume the mean and standard deviation of this hypothetical normal distribution are given by the sample mean and standard deviation, respectively ($\bar{x} = 80.68$, $s = 12.00$). Validate this assumption using Chi-Square test.

Group (mm Hg)	Observed frequency	Expected frequency	Group	Observed frequency	Expected frequency
<50	57		≥80, <90	4604	
≥50, <60	330		≥90, <100	2119	
≥60, <70	2132		≥100, <110	659	
≥70, <80	4584		≥110	251	
			Total	14,736	14,736

2. A study looked at the effects of OC use on heart disease in women 40 to 44 years of age. The researchers found that among 5000 current OC users at baseline, 13 women developed a myocardial infarction (MI) over a 3-year period, whereas among 10,000 non-OC users, 7 developed an MI over a 3-year period. Assess the statistical significance of the results using Z-test and Chi-Square test.
3. A genetics student wished to repeat one of Gregor Mendel’s classic experiment with garden peas. She decided to study two characteristics: stem length and seed pod color. From her research she knows that a single gene locus with two alleles controls stem length. AA or Aa produces tall plants (about 1m) while aa produces short plants (approximately 0.5 m). Also a single locus with two alleles controls seed pod color with BB and Bb producing green seed pods and bb producing yellow seed pods. In other words, both loci exhibit complete dominance. From Mendel’s published work these two gene loci are assumed to be independently assorting. The student crosses together plants that are tall with green seed pods and are known to be heterozygous at both loci:

tall, green pods (AaBb) **x** tall, green pods (AaBb)



Experimentally produced offspring:

180 tall, green pods (A_B_)

30 tall, yellow pods (A_bb)

60 short, green pods (aaB_)

10 short, yellow pods (aabb)

If these genes behave according to Mendel's law, she expects the offspring to be in a 9:3:3:1 ratio. (1) Test this hypothesis. (2) If the results deviate significantly from a 9:3:3:1 ratio, try to figure out exactly why the data set failed to meet the expectation using more hypothesis tests.