

Math 10B with Professor Stankova

Quiz 13; Tuesday, 4/30/2019

Section #203; Time: 11 AM

GSI name: Roy Zhao

Name: _____

Circle True or False or leave blank. (1 point for correct answer, -1 for incorrect answer, 0 if left blank)

1. **TRUE** False For fixed r , the p value $P(R \geq r)$ increases as the degrees of freedom go up.
2. **TRUE** False The χ^2 distribution with $k = 2$ degrees of freedom is the same as an exponential distribution.

Solution: When $k = 2$, the distribution is $\frac{1}{2^1\Gamma(1)}x^{1-1}e^{-x/2} = \frac{1}{2}e^{-x/2}$ which is an exponential distribution.

Show your work and justify your answers. Please circle or box your final answer.

3. (10 points) You wonder whether affirmative action has an effect. Data from the University of Michigan suggests that without affirmative action, Asians should make up 15% of the student population, African Americans 5%, Hispanics 5%, Whites 75%. The observed data with affirmative action is given below. Can we conclude that affirmative action has an effect with a significance level of 5%?

	Observed Data	
Asians	16	
African Americans	11	
Hispanic	7	
White	66	

Solution: The null hypothesis is that we expect a ratio of 15 : 5 : 5 : 75, and the alternative one is that it is not this distribution.

The filled out table is:

	Observed Data	
Asian	16	15
African American	11	5
Hispanic	7	5
White	66	75
Total	100	100

So the r value is

$$r = \frac{1^2}{15} + \frac{6^2}{5} + \frac{2^2}{5} + \frac{9^2}{75} = \frac{1}{15} + \frac{36}{5} + \frac{4}{5} + \frac{81}{75} = 9\frac{11}{75}.$$

There are 3 degrees of freedom and the significance level is 0.05 so the critical value is 7.81. Then we see that $9\frac{11}{75} > 7.81$ and so we reject the null hypothesis and say that affirmative action had an effect.