Practice FRQs

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1. (a) On Campus = $\frac{17+7}{33} = .7273$; Off Campus = $\frac{25+12}{67} = .5522$

   (b) The graph shows that a higher proportion of off campus students do not participate in an activity (a little over 40%) than on campus students (a little over 20%). The groups are roughly likely to participate in two or more activities (a little over 20% versus a little under 20%). A much larger portion of on campus students participate in one activity (about 70%) than do off campus students (a little under 40%). Thus, there is some evidence to indicate that off campus students are less likely to be in an activity, though on campus students generally do one activity.

   (c) Assuming a significance level of $\alpha = .05$, we do not have convincing evidence to suggest association between residential status and activity participation. Thus, because $.23 > .05$, we fail to reject H_0, and the administrator should conclude that there is no association.

2. (a) $\frac{3}{9} \cdot \frac{2}{8} \cdot \frac{1}{7} = .0119$

   (b) Because the probability is quite small (.0119), it would make sense to doubt management's claim, as an event like this is quite unlikely to happen.

   (c) This appropriately models the given scenario. Because there are 6 men and 3 women, the ratio of man to woman must be kept $2 : 1$. Because the situation with the dice is $4 : 2$, the ratio is kept the same, and, thus, models the situation appropriately.

3. (a) To use cluster sampling, the landlord should select each floor as a cluster. Because each floor has four apartments and eight are needed, two floors should be selected at random. This can be done by assigning numbers to each floor, say 0-8. Then, using a random number generator, two different values from 0 to 8 should be selected. The corresponding floors are selected.

   (b) As the strata are children and no children, and there are 8 apartments with children and 24 without, the landlord should use simple random samples by numbering apartments with children 0-7 and apartments without children 0-23. After this, the landlord should generate two different, random integers from 0 to 7 and six different, random integers from 0 to 23. Each integer corresponds to a given apartment, with or without children.

4. **State:**

H_0 : There is no association between age group and eating five or more servings of fruits and vegetables a day; H_a : There is an association between age group and eating five or more servings of fruits or vegetables a day
$\alpha = .05$

Plan

Procedure: Chi-square test for independence
Random: Stated in problem
Conditions: 10%: 8,866 adults $\leq \frac{1}{10}$ (all adults)
Large Counts: $240.2 \geq 5$

Do:

$\chi^2 = \sum \frac{(O-E)^2}{E}$
$\chi^2 = \frac{(231-240.2)^2}{240.2} + \frac{(741-731.8)^2}{731.8} + \cdots + \frac{(3692-3751.6)^2}{3751.6} = 8.98$
$p(\chi^2 > 8.98,\ \text{df} = 2) = .0112$

Conclude:

5.

6. (a)

(b) i.

ii.

(c)

(d)