Stat 217, Practice Exam 2 Solutions

Multiple Choice Problems

1. E (because the marbles are sampled with replacement)
2. A
3. There is no correct answer ... it should be N(100, 8.9443)
4. A
5. B
6. D (the number of successes is the same as the number of 1s)
7. A

Choose the correct Statistical Test

C chi-square

B test of two proportions

Show Your Work Problems

8. (a) Let p_1 be the proportion of dogs exposed to the herbicide that get lymphoma, and let p_2 be the proportion of dogs not exposed to the herbicide that get lymphoma. The hypotheses are:

$$H_0 : p_1 = p_2$$

$$Ha : p_1 > p_2$$

   (b) The estimated proportions are: $\hat{p}_1 = 473/827$, $\hat{p}_2 = 19/130$, the pooled estimate of p is $\hat{p} = (473 + 19)/(827 + 130)$. When you plug these into the formula for the two-sample test statistic you get: $z = 9.0296$

   (c) $z \sim N(0, 1)$

   (d) The p-value is $P[z > 9.02] = 0.00$

   (e) Since the p-value is less than .05 we REJECT H0

   (f) The evidence suggests that dogs exposed to the herbicide are more likely to develop lymphoma.

9. Use the formula for sample size $n = \left(\frac{z^*}{m}\right)^2 p(1-p)$ where $z^* = 1.96$, $m = .05$, and $p = .5$ (use $p = .5$ to make sure the margin of error will be no greater than .05) and you get $n = 385$.

10. (a) $217/310 \pm \sqrt{\frac{(217/310)(1-217/310)}{310}} = (.64, .75)$

    (b) We are 95% confident that the true proportion of college students who carry a credit card balance from month to month is between 64% and 75%. Thus, we are confident that the a majority of college students carry a credit card balance from month to month.

11. (a) Conditional on the free-of-pain patients, we have 23/100 on Drug 1, 30/100 on Drug 2, 22/100 on Drug 3, and 25/100 on Drug 4.

    (b) i. H_0 : There is NO association between Pain and Drug Taken
    H_a : There is an association between Pain and Drug Taken

    ii. $(52)(95)/195 = 25.333$

    iii. $\frac{(25-23.08)^2}{23.08} = .1597$

    iv. χ^2 with 3 degrees of freedom

    v. Since the p-value of .184 is less than .05 we FAIL TO REJECT H0

    vi. The evidence fails to suggest that there is an association between Pain and Drug Taken.

    vii. D