STAT303 Sec 509
Spring 2001
Exam #2
Form A

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1. **Don't EVEN open this until you are told to do so.**
2. There are 20 multiple-choice questions on this exam, each worth 5 points. There is partial credit. Please mark your answers **clearly** on the scantron. Multiple marks will be counted wrong.
3. Please turn in BOTH YOUR SCANTRON AND YOUR EXAM. Since you may not get your copy back, **BE SURE AND MARK YOUR SCANTRON CORRECTLY**.
4. You will have 60 minutes to finish this exam.
5. If you are caught cheating or helping someone to cheat on this exam *or talking to someone after class about this exam*, you both will receive a grade of **zero** on the exam. You must work alone.
6. This exam is worth 100 points, and will constitute 20% of your final grade.
7. Good luck!

1. Using the page of graphs, which picture best represents $P(Z < 1.5)$? *Ans: the shaded area will be about 93% and it will be shaded on the left*

   A. F
   B. E
   C. D
   D. C
   E. B

2. Again using the page of graphs, which picture best represents $P(-2.5 < Z < 2.5)$? *Ans: the area shaded will be about the center 99%*

   A. A
   B. B
   C. C
   D. D
   E. E

3. Let $p_{90} \sim N(0.7, 0.048^2)$. What is $P(p_{90} < 0.6)$?

   A. 0.9812
   B. 2.08
   C. -2.08
   D. 0.0188
   E. 0.7881

4. Which of the following is NOT one of the properties of the sampling distribution of the sample proportion, p?

   A. $\sigma_p = \sqrt{\pi(1-\pi)/n}$
   B. normal in shape if $n\pi \geq 5$
   C. $\mu(p) = \pi$
   D. None of the above are a property.
   E. Two of the above are NOT properties.

5. Which of the following is/are true?

   A. If two events, A and B, are independent, then they can't both happen.
   B. If two events, A and B, are independent, then they're conditional probabilities are equal.
   C. If two events, A and B, are dependent, then we sum their probabilities to get $P(A$ and $B)$, instead of multiplying them.
   D. If two events, A and B, are independent, then knowing one happened tells us nothing about the other.
   E. Two of above statements are true.

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 Afraid to| Gender
walk alone?|       men      women |     Total
-----------+----------------------+----------
        no |         9          4 |        13
           |     37.50      16.67 |     54.1
-----------+----------------------+----------
       yes |         4          7 |         1
           |     16.67      29.17 |     45.83
-----------+----------------------+----------
      Total|        13         11 |        24
           |     54.17      45.83 |    100.00
  Pearson chi2(1) =   2.5926   Pr = 0.107
```

6. Using the output above, is there any difference between the proportion of men and women who are afraid to walk alone? A difference would be saying there's some relationship between *Gender* and *Afraid*, so no difference would mean 'being afraid or not' is independent of 'gender'.

   A. Since the p-value is larger than 5%, we can not say the two categories are *independent*, so it seems there is some difference.
   B. Since the p-value is larger than 5%, we can not say the two categories are *dependent*, so, no, there's no statistical difference.
   C. Of course there's a difference. The proportion of 'afraid' women is more than half, where the men is less than half
   D. Since the p-value is larger than 5%, we can not say the two categories are *dependent*, so it seems there is some difference.
   E. Since the p-value is larger than 5%, we can not say the two categories are *independent*, so, no, there's no statistical difference.

7. Let $p_{60} \sim N(0.5, 0.065^2)$. What is the range of the middle 95% of these p_{60}'s? In other words, what are pA_{60} and pB_{60} such that $P(pA_{60} < p_{60} < pB_{60}) = 0.95$ (centered at the mean, $\pi = 0.5$)?

   A. $(-1.645, 1.645)$
   B. $(0.39, 0.61)$
   C. $(-1.96, 1.96)$
   D. $(0.435, 0.565)$
   E. $(0.37, 0.63)$

8. Why do we need a larger sample when the proportion is really small (or large)?

   A. Small proportions are harder to find, so we need more data to compensate.
   B. Small proportions need more accuracy (smaller standard deviations), so we need more data.
   C. Small proportions cause the distribution to be skewed, so we need more data to make it look normal.
   D. We just need $n \geq 5$.
   E. None of the above are correct statements.

9. We want to know the true percent of votes for Student Body President candidate A will get. Since we don't know this proportion, we poll 250 students to make sure we get 'good' results. Are the conditions for the normal approximation met in this situation, *i.e.*, can we use the normal curve to calculate a confidence interval from our data?

   A. No, the proportion changes from day to day.
   B. No, the data is categorical, so we can never use a continuous curve.
   C. No, students will vote just like the person in front of them.
   D. Yes, this is the only method we have, so we have to use the normal approximation.
   E. Yes, all of the conditions are met as long as the true percent is between 4 and 96%.

10. What is the 70th percentile for the distribution of p's, where $p_{25} \sim N(0.5, 0.1^2)$?

    A. 0.70
    B. 0.52
    C. 0.57
    D. 0.552
    E. 0.56

11. Which of the following would produce the narrowest confidence interval for π, the true population proportion?

    A. a 95% interval with a sample size, $n = 20$
    B. a 90% interval with a sample size, $n = 100$
    C. a 90% interval with a sample size, $n = 40$
    D. a 95% interval with a sample size, $n = 100$
    E. a 95% interval with a sample size, $n = 40$

12. Which of the following normal curves would be the *widest*?

    A. $p_{50} \sim N(0.4, 0.069^2)$
    B. $p_{50} \sim N(0.5, 0.071^2)$
    C. $p_{25} \sim N(0.5, 0.1^2)$
    D. $p_{50} \sim N(0.6, 0.069^2)$
    E. $p_{25} \sim N(0.4, 0.098^2)$

13. What z-scores do you need for a 83% confidence interval?

    A. ± 0.83
    B. ± 0.085
    C. ± 0.955
    D. ± 1.37
    E. ± 0.7967

14. What is the 57th percentile for the standard normal, $Z \sim N(0, 1^2)$?

    A. 0.57
    B. 0.43
    C. 0.7157
    D. 0.18
    E. 0.2843

X	p(X)
0	0.4
2	0.3
4	0.2
6	0.1

15. What are the mean, μ_X, and standard deviation, σ_X, for the distribution above?

    A. $\mu_X = 2$, $\sigma_X = 8$
    B. $\mu_X = 2$, $\sigma_X = 2.83$
    C. $\mu_X = 3$, $\sigma_X = 2.83$
    D. $\mu_X = 2$, $\sigma_X = 2$
    E. $\mu_X = 3$, $\sigma_X = 2$

16. Using the same distribution, what is $P(X = 3)$?

    A. 0, you can't have a 3 in the distribution above.
    B. 0, X is continuous, so all '=' probabilities are 0.
    C. 0.5, since it's in the middle.
    D. 0.5, since it's the mean and median.
    E. 0.25, since it's halfway between 2 and 4.

17. Why do we always use the sample proportion, p, instead of just the count, X?

    A. Counts vary more.
    B. Every p will be closer to π than any X will be to $n\pi$.
    C. The sampling distribution of p will be normal, but the distribution of X won't.
    D. All of the above are true.
    E. It's doesn't matter which we use since p is just a scale change on X.

18. Let X be a non-standard normal, say $X \sim N(5, 3^2)$. What is $P(2 < X < 6)$?

    A. 0.788
    B. 0.5294
    C. 0.4706
    D. 0.212
    E. 0.0228

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95% CI for 0-1 proportion pi (approximate):
n = 132, p = .45
Lower Limit = .36513107
Upper Limit = .53486893
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19. The confidence interval above is for the true proportion of male students in STAT303 classes. Is it *statistically* plausible to say that the classes are about half-and-half (50% males and females)?

    A. No, there are only 45% males.
    B. We can't determine plausibility with a confidence interval.
    C. No, we are only looking at one class, so we can't make any statements about the other classes.
    D. Yes, there's a statistical difference between the 59 males and 73 females.
    E. Yes, it's plausible that the true proportion of males is 50%.

20. Given $p_{50} \sim N(0.6, 0.069^2)$, what is $p*$ such that $P(p_{50} > p*) = 0.40$?

    A. 0.25
    B. 0.6173
    C. 0.6554
    D. 0.3446
    E. 0.5724

1A,2A,3D,4B,5D,6B,7E,8C,9E,10D,11B
12C,13D,14D,15D,16A,17A,18C,19E,20B