Signature:

Instructions:

- There are 12 problems and each problem has several parts. Check that you have all 12 problems.
- Write the answers and show the main steps of your work on this test paper.
- Cell phones must be turned off and put away!
- Place your picture ID on the desk in front of you.
- Formulas and tables are printed in a separate handout.

DO NOT WRITE ON THE REST OF THIS COVER SHEET!
(Your instructor will use this sheet for recording your scores.)

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<td>PART1</td>
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1. a) (2 pts) Determine the appropriate level of measurement: salaries of college professors.
A) Ratio    B) Ordinal    C) Interval    D) Nominal

b) (2 pts) Is the following study experimental or observational? A stock analyst selects a stock from a group of 15 stocks for investment by choosing the stock with the greatest earnings per share for the most recent quarter.
A) Experimental    B) Observational

c) (2 pts) Which type of sampling is used in the following? A market researcher selects 500 drivers under 30 years of age and 500 drivers over 30 years of age.
A) Cluster    B) Systematic    C) Stratified    D) Random
   E) Convenience

2. a) (3 pts) Suzie is 70 inches in height. If the mean height of all females is 64.5 inches and the standard deviation is 2.5 inches, compute Suzie’s z-score

\[ z = \]

b) (3 pts) Which score has a better relative position, a score of 35.1 on a test for which \( \bar{x} = 30 \) and \( s = 3 \), or a score of 260 on a test for which \( \bar{x} = 270 \) and \( s = 27 \)? Explain your answer.

c) (3 pts) Find the mean and the median for the following data set.

\[ 25 \ 25 \ 23 \ 26 \ 26 \ 23 \ 28 \ 25 \ 33 \ 29 \]
3 a) (4 pts) Compute the sample standard deviation $s$ for the following data. The prices for CD players in dollars are 249 195 162 446 279 214 307 187. The mean of these data is 254.88.

b) (2 pts) Weekly sales at Joe's gas station average $\bar{x} = $10,000 with a standard deviation $s = $450. Last week's sales were $9050. Is this unusually low? Explain in terms of $\bar{x}$ and $s$.

c) (4 pts) Find the percentile of the data point 114 in the following data set.

108 120 112 106 114 116 106 104 111 108 112 122 104 108 110 105

Part II

1 a) (2 pts) Suppose 10 books are returned from editing (for errors). Let $A$ be the event that all 10 are errorless. Describe in words the complementary event $\bar{A}$.

The complement $\bar{A}$ is ___________________________________________

b) (4 pts) In a certain town 70% of adults have health insurance. What is the probability that 6 randomly selected adults from this town all have health insurance?
c) (4 pts) A couple plans to have 4 children. What is the probability they will have at least one girl? Assume either birth gender is equally likely.

2 Your friend has 8 cards consisting of 4 kings and 4 queens which are randomly shuffled. You select without replacement 2 cards in sequence. Let \( A \) be the event that the first selection is a queen; let \( B \) be the event that the second selection is a king.

a) (4 pts) Find the probability that both \( A \) and \( B \) occur.

b) (4 pts) Find the probability that \( A \) or \( B \) occurs. (You may assume that \( P(B) = \frac{1}{2} \)).

3 Many Dewitt telephone numbers have the form 446-____.

a) (2 pts) How many such numbers are possible?

b) (2 pts) How many are possible if the last four entries are all odd digits?

c) (3 pts) How many are possible if they have the form 446-a b c d where a, b, c, d are all different?
Part III

1 a) (6 pts) 10% of all Syracuse drivers were involved in a car accident last year. If 12 drivers are randomly selected, what is the probability of getting 2 or more who were involved in a car accident last year?

b) (6 pts) Would it be unusual for exactly 3 of the 12 drivers to be involved in an accident? Give a supporting calculation.

2 a) (6 pts) The weight of a certain machine component is normally distributed with a mean of 8.92 g and a standard deviation of 0.06 g. Find the percentage of weights that fall between 8.82 g and 9.00 g.

b) (6 pts) For the weights in part a) find the weight that separates the heaviest 3% of the weights from the rest.
3) a) (3 pts) For a binomial distribution with parameters $n = 33$ and $p = 0.9$ is it suitable to use the normal distribution as an approximation? Give a supporting calculation.

b) (4 pts) The Paris Metro says that 74% of its trains are on time. A check of 50 randomly selected trains shows that 35 of them arrived on time. **USING THE NORMAL APPROXIMATION** find the probability that among the 50 trains, 35 or fewer arrive on time. No credit if the normal approximation is NOT used!

Part IV

1 a) (5 pts) If the confidence interval for the population proportion is given as $-0.056 < p < 0.964$, give the sample proportion $\hat{p}$ of the sample that gave rise to this confidence interval.

b) (5 pts) A random sample of $n = 401$ telephone calls had a sample standard deviation of $s = 3.8$ minutes for the time duration of the telephone call. Find the margin of error $E$ for a 90% confidence interval for $\mu$. 
2 a) (5 pts) Of 116 randomly selected adults, 34 were found to have high blood pressure. Construct a 95% confidence interval for the true percentage of all adults that have high blood pressure.

b) (5 pts) A savings and loan association needs information concerning the checking account balances (which are assumed to be normally distributed) of its customers. A random sample of 16 accounts was checked and yielded a mean balance of $764.14. The standard deviation of all checking account balances is known to be $317.29. Find a 95% confidence interval for the true mean of checking account balance for local customers.

3 a) The amounts (in ounces of juice) on eight randomly selected juice bottles had a sample standard deviation of 0.2900 ounces. Find a 98% confidence interval for the population standard deviation \( \sigma \).