Note: NOTA denotes *N*one *O*f *T*hese *A*nswers

1. Rob and Alex just got the results of the SAT and ACT scores back. Alex scored a 1470 on the SAT and Rob scored a 25 on the ACT. It is known that the test score distributions for SAT and ACT scores are both approximately normal with means 1040 and 21 respectively, and *variances* of 13225 and 10.24 respectively. Given that the tests are of equal difficulty and test the same ability/material, who performed better on their test?

   A) Alex C) They performed equally. E) NOTA
   B) Rob D) It cannot be determined.

2. Which of the following is/are true?

   I) A correlation coefficient of zero indicates that there is no relationship between two variables.
   II) Researchers find that the correlation coefficient between average number of cigarettes smoked per day and average age of death is -0.98. They can logically conclude that cigarettes cause a premature death.
   III) Covariance is a measure of the relationship between two variables that is bounded in the interval [-1,1].

   A) I only B) I & III only C) I,II,III D) None are true E) NOTA

3. The number of samples in a sampling distribution is "n". As "n" increases for a sampling distribution, what distribution does the t-distribution asymptotically approach?

   A) Z B) χ^2 C) F D) Uniform E) NOTA

4. Jeremy sits at home on a Friday night and decides to conduct an experiment. He decides to throw a die until it lands with a 5 on the up-face. He records the number of trials required for this occurrence. Which of the following best describes this experiment?

   A) Binomial B) Geometric C) Poisson D) Multinomial E) NOTA

5. Nick sits at home on a Saturday night and decides to conduct an experiment. He throws a die 20 times, recording the outcome (1 through 6) for each trial. Given that the trials are independent, the die is fair, and the same die is used for each throw, which of the following best describes this experiment?

   A) Binomial B) Multibernoulli C) Poisson D) Multinomial E) NOTA

6. Alex sits at home on a Sunday night and decides to conduct an experiment. He throws a die 10 times and records the number of times he observes a 2 on the up-face. Which of the following best describes this experiment?

   A) Binomial B) Geometric C) Poisson D) Multinomial E) NOTA

7. Rob sits at home on a Monday night and decides to conduct an experiment. He sits on his balcony and counts the number of cars that pass by during a one hour interval. Which of the following best describes this experiment?

   A) Binomial B) Geometric C) Poisson D) Bernoulli E) NOTA

8. A random variable, X, is uniformly distributed on the interval [-1,1]. What is the probability that $X > -1/4$.

   A) 0.0987 B) 0.375 C) 0.625 D) 0.9013 E) NOTA

9. Rob plots his observed data points from an experiment with the least-squares regression line he calculated. He then observes that when he plots the residuals, they form a perfect quadratic form. Which of the following can Rob logically conclude?

   A) This particular line is a good fit since the residuals form a distinct pattern.
   B) This particular data set doesn't lend itself to a linear regression because of the distinct pattern formed by the residuals.
   C) His regression line would be better fit if multiplied by a constant.
   D) His regression line would be better fit if a constant was added.
   E) NOTA

10. Anette is flipping a coin while bored at work. Her first 6 tosses yielded the data set {H,T,T,H,H,T} where H represents observing a head and T represents observing a tail. What is the probability that her next, 7^{th}, toss will yield a tail? (Note: Round your answer to four decimal places).

    A) 0.0078 B) 0.0156 C) 0.0313 D) 0.5000 E) NOTA

11. Given the following "5-number-summary", which of the following best describes the data?

    A) Skewed Left
    B) Skewed Right
    C) Symmetric (approximately)
    D) Not enough information is given.
    E) NOTA

Min	0
Q_1	34
Med	82.4
Q_3	95
Max	100

12. Which of the following is an application of the Central Limit Theorem?

    I) Sampling 100 observations from a right-skewed distribution will yield a sampling distribution that is approximately normal.
    II) Sampling 10 observations from a left-skewed distribution will yield a sampling distribution that is approximately normal.
    III) Sampling 10 observations from a *t*-distribution will yield an approximately normal distribution for the sampling mean.

    A) I only B) I & II only C) II & III only D) II only E) NOTA

13. What is the area under the t-distribution with six degrees of freedom between the $t_6 = 2.447$ and $t_6 = 1.440$?

A) 0.025 B) 0.075 C) 0.925 D) 0.975 E) NOTA

14. A shipment of 20 televisions contains one defective television. What is the probability of buying four televisions and finding that one is defective? (Round your answer to the nearest hundredth.)

A) 0.10 B) 0.15 C) 0.20 D) 0.34 E) NOA

15. A population of 1,000,000 people has ages that are normally distributed with mean 42 and variance 289. Consider all possible samples of 500 people from this population. What would be the standard deviation of sample means? (Note: Round your answer to 3 decimal places).

A) 0.034 B) 0.578 C) 0.760 C) 12.924 E) NOTA

16. Which of the following is true of a left-skewed distribution?

A) mode < median < mean
B) mode < mean < median
C) mean < median < mode
D) mode = median = mean
E) NOTA

17. Brooke plays the "Cash 16" lottery game where a ticket costs \$2. The probability of winning \$100 is 0.05, the probability of winning \$1000 is 0.001 and the probability of winning the \$1,000,000 jackpot is 0.00001. If Brooke plays this game a large number of times, what is the expected net amount gained/lost by Brooke? (Positive is a gain, Negative is a loss for Brooke).

A) \$14 B) \$14.10 C) \$15.90 D) \$16 E) NOTA

18. Two independent samples of size 500 are taken and analyzed. For the significance level $\alpha = 0.88\%$, what is the critical value (or critical test statistic) which indicates weather the difference between the sample means is significant.

A) ±1.645 B) ±1.96 C) ±2.33 D) ±2.62 E) NOTA

19. Tom's string plant produces string and sells it under the "50 feet per roll" label. An audit discovers that in actuality only 4% of the rolls are longer than 50 feet per roll. Assume the lengths of the string produced are normally distributed with variance 4. If the company was to correct itself and label the string rolls honestly, what would the mean (or average) length they should put on the label? (Note: Round your answer to the nearest tenth of a foot per roll).

A) 45.0 B) 46.5 C) 47.0 D) 48.0 E) NOTA

20. A standardized test in science and math was given to a randomly selected group of six students. Their results are outlined in the table below. Using the null hypothesis, H_o, that there is no correlation (or covariance) between science and math scores on the exam, which of the following is/are true?

Student	A	B	C	D	E	F
Science Grade	80	70	65	90	85	60
Math Grade	75	60	65	80	75	70

A) Accept H_o at the at the 5%, 2%, and 1% significance levels.
B) Accept H_o at the 5% and 2% significance levels, but reject at 1%.
C) Accept H_o at the 5% significance level, but reject at both 2% and 1%
D) Reject H_o at the 5%, 2%, and 1% significance levels.
E) Not enough information / NOTA

21. A given airport is known to average (or have an expected value) of 1.2 airplane crashes per year. What is the probability (to the nearest hundredth) that there will be 2 airplane crashes at that airport in a particular year?

A) .17 B) 0.20 C) 0.22 D) 0.25 E) NOTA

22. A study found that the mean income for a small (less than ten employees) partnership company was \$53,600 based on the survey of 25 randomly sampled companies of this type. The standard deviation of the sample, S_x, is 6300. Assume that the income for companies of this type is approximately normally distributed. Determine the confidence interval (99%) for the population mean. (Round your answer to the nearest whole dollar).

A) \$50,076 to \$57,124
B) \$50,088 to \$57,111
C) \$50,355 to \$56,844
D) \$50,417 to \$57,271
E) NOTA

23. Which of the following is true of the *F*-Distribution?

I) The distribution is skewed to the left.
II) The distribution is discrete.
III) It takes two parameters (degrees of freedom) to completely define the distribution.

A) I & II only B) II only C) III only D) I & III only E) NOTA

24. A test is developed to measure mathematical skills. It measures two factors – logical ability and computational ability – as if they were one skill. A better test would measure these skills/abilities separately. This is an example of the experimental issue known as … ?

A) Placebo effect B) Blinding C) Doubling D) Confounding E) NOTA

Note: The following information/table applies to questions 25,26, and 27

The following frequency table provides data on the occurrence of whether or not an employee walks to work or they bring their lunch.

Bring your lunch?	Walk to work? Yes	Walk to work? No
Yes	11	34
No	9	30

25. What is the probability, to the nearest hundredth, that if an employee is selected that the employee brings their own lunch?

A) 0.11 B) 0.13 C) 0.49 D) 0.54 E) NOTA

26. If the events of bringing your lunch and walking to work were independent of one another, how many employees would you expect to walk to work and not bring their lunch? (Round your answer to the nearest *whole* employee).

A) 8 B) 9 C) 10 D) 11 E) NOTA

27. Perform a chi-squared test to test the independence of walking to work and bringing your lunch. If during the computation of the test statistic the intermediate calculated values are carried to five decimal places, find the value of the test statistic to five decimal places.

A) 0.01229 B) 0.02015 C) 0.02158 D) 0.03011 E) NOTA

28. A group of 32 lab rats is investigated, and found that the lifespans have a mean and variance of four years, using Chebyshev's Theorem. What is the maximum number of lab rats that will live longer than 8 years?

A) 6 B) 7 C) 8 D) 9 E) NOTA

29. The Centers for Disease Control reports that the mean blood pressure for people ages 30-35 is 140 and the standard deviation in this population is 17. A statistician examines the records of 90 patients ages 30-35 and finds the mean of their blood pressures is 142.5. Assume that 17 is also the standard deviation of the sample's blood pressures. Find the power of this test against the alternative $\mu=145$ and $\alpha=0.05$. (Round your answer to 4 decimal places).

A) 0.0119 B) 0.2033 C) 0.7967 D) 0.8739 E) NOTA

30. Given the following $\{x, y\}$ data, what is the absolute value of the test statistic when a linear regression test is performed with H_o: $\beta = 0$ and H_a: $\beta \neq 0$. (Round your answer to the nearest thousandth)

x	-41	30	30	-11	34	-14
y	35	36	20	42	-35	-4

A) 0.449 B) 0.837 C) 1.194 D) 1.96 E) NOTA

Critical Values of the Pearson Product-Moment Correlation Coefficient

df = n - 2

Level of Significance (p) for Two-Tailed Test	**0.1**	**0.05**	**0.02**	**0.01**
df				
1	0.988	0.997	0.9995	0.9999
2	0.9	0.95	0.98	0.99
3	0.805	0.878	0.934	0.959
4	0.729	0.811	0.882	0.917
5	0.669	0.754	0.833	0.847
6	0.622	0.707	0.789	0.834
7	0.582	0.666	0.75	0.798
8	0.549	0.632	0.716	0.765
9	0.521	0.602	0.685	0.735
10	0.497	0.576	0.658	0.708