全部五十題，每題兩分，選擇題爲單選題

1 John Chen, Marketing Director of Plano Power Plant's Electrical Division, is leading a study to identify and assess the relative importance of product features. John directs his staff to design a survey questionnaire for distribution to 100 of Plano's 954 customers. John is ordering a _____.

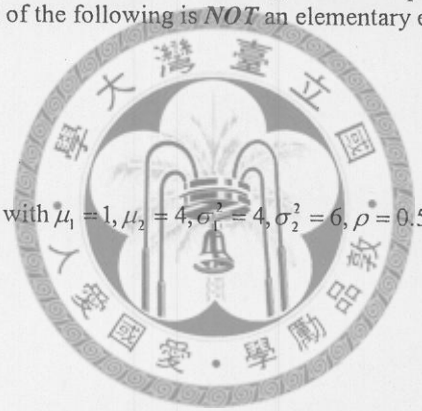
*A* statistic from the customers
*B* census of the customers
*C* sorting of the customers
*D* sample of the customers

2 Which of the following is ***NOT*** a commonly used measure of variability?

*A* variance
*B* standard deviation
*C* mean absolute deviation
*D* average deviation

3 In a set of 15 aluminum castings, two castings are defective (D), and the remaining thirteen are good (G). A quality control inspector randomly selects 3 of the 15 castings without replacement, and classifies each as defective (D) or good (G). Which of the following is ***NOT*** an elementary event for this experiment?

*A* (D, D, G)
*B* (G, D, G)
*C* (D, D, D)
*D* (G, G, G)



4 Let X and Y be random variables with $\mu_1 = 1, \mu_2 = 4, \sigma_1^2 = 4, \sigma_2^2 = 6, \rho = 0.5$, Which one of the following is the (mean, variance) of Z = 3X-2Y?

*A* (-5, 60)
*B* (5, 80-$\sqrt{6}$)
*C* (10, 30$\sqrt{6}$)
*D* (-5, 60-12$\sqrt{6}$)

5 Abel Lee, Director of Human Resources, is exploring employee absenteeism at the Plano Power Plant. An analysis of personnel records indicated that 20% of all plant employees are absent excessively. This is an example of assigning probabilities by the _____ method.

*A* subjective probability
*B* relative frequency
*C* classical probability
*D* a priori probability

6 The probability of a student randomly guessing the answers to 25 multiple choice questions is best modeled with the _____.

*A* binomial distribution
*B* hypergeometric distribution
*C* Poisson distribution
*D* hyperbinomial distribution

7 100 policyholders file claims with CareFree Insurance. 10 of these claims are fraudulent. Claims manager Earl Lee randomly selects 4 of the 10 claims for thorough investigation. If X represents the number of fraudulent claims in Earl's sample, X has a _____.

*A* normal distribution
*B* hypergeometric distribution, but may be approximated by a binomial
*C* binomial distribution, but may be approximated by a normal
*D* binomial distribution, but may be approximated by a Poisson

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8 If X is the number of successes in an independent series of 10 Bernoulli trials, then X has a _____ distribution.

*A* hypergeometric
*B* Poisson
*C* normal
*D* binomial

9 Let X have the uniform distribution with p.d.f. f(x)=1, 0<x<1, zero, elsewhere. Find the distribution function of Y= -2 ln X. What is the p.d.f. of Y?

*A* Gamma: G(2)
*B* Gamma: G(4)
*C* Normal distribution: N(2,1)
*D* Chi–Square: $\chi^2(4)$
*E* Chi–Square: $\chi^2(2)$

10 Financial analyst Larry Lee needs a sample of 100 securities listed on either the New York Stock Exchange (NYSE) or the American Stock Exchange (AMEX). According to the Wall Street Journal's "Stock Market Data Bank," 2,531 NYSE securities and AMEX 746 securities were traded on the previous business day. Larry directs his staff to randomly select 77 NYSE and 23 AMEX securities. His sample is a _____.

*A* proportionate stratified sample
*B* disproportionate stratified sample
*C* disproportionate systematic sample
*D* proportionate systematic sample

11 The central limit theorem is applicable _____.

*A* only to symmetrical populations
*B* when the sample size is 20 or more
*C* regardless of the shape of the population distribution
*D* only to unimodal populations

12 A statistics student made the following grades on 5 tests: 84, 78, 88, 72, and 72. What is the median grade?

*A* 88
*B* 78
*C* 72
*D* 80

13 David Chin, VP of Human Resources of American-1 Banks (A1 Bank), is reviewing the employee training programs of A1 banks. His staff compiled the following table of regional statistics on teller training hours.

| | Southeast Region | Southwest Region |
|---|---|---|
| Mean | 20 | 28 |
| Median | 20 | 20 |
| Mode | 20 | 21 |
| Standard Deviation | 5 | 7 |

What can David conclude from these statistics?

*A* the Southwest distribution has the greater relative dispersion
*B* the Southwest distribution is skewed to the left
*C* the Southeast distribution has the greater relative dispersion
*D* the Southeast distribution is not skewed

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14 Of 10 people on a student newspaper staff, 6 are familiar with a particular word processing package. If three people are randomly selected and assigned to work as a team, how many ways could a team be selected in which one was familiar with the word processing package and the other two were not?

*A* 24
*B* 120
*C* 20
*D* 36

15 Ade Liu manages a portfolio of 200 common stocks. Her staff classified the portfolio stocks by 'industry sector' and 'investment objective.' If a stock is selected randomly from Ade's portfolio, P(Airlines|Income) = _____.

| Investment Objective | Industry Sector | | | Total |
|---|---|---|---|---|
| | Electronics | Airlines | Healthcare | |
| Growth | 100 | 10 | 40 | 150 |
| Income | 20 | 20 | 10 | 50 |
| Total | 120 | 30 | 50 | 200 |

*A* 0.10
*B* 0.40
*C* 0.25
*D* 0.67

16 Suppose a committee of 3 people is to be selected from a group consisting of 4 men and 5 women. What is the probability that all three people selected are men?

*A* 0.11
*B* 0.33
*C* 0.50
*D* 0.80

17 Aluminum castings are processed in lots of five each. A sample of two castings is randomly selected from each lot for inspection. A particular lot contains one defective casting; and X is the number of defective castings in the sample. P(X=1) is _____.

*A* 0.2
*B* 0.4
*C* 0.6
*D* 0.8

18 Let X be a binomial random variable with n=20 and p=.8. If we use the normal distribution to approximate probabilities for this, a correction for continuity should be made. To find the probability of more than 6 but less than 12 successes, we should find _____.

*A* P(6<X<12)
*B* P(6.5<X<12.5)
*C* P(6.5<X<11.5)
*D* P(5.5<X<12.5)

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19 The eight employees of the IT Center and whether they possess 'mission critical skills' are listed in the following table.

| Employee | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|
| Mission Critical | No | No | Yes | No | Yes | No | No | No | No |

If a sample of two employees is selected without replacement, which of the following is ***NOT*** a possible sample proportion of "mission critical"?

*A* 1.00
*B* 0.00
*C* 0.22
*D* 0.50

20 If X is $N(\mu, \sigma^2)$, then $E(|X-\mu|)$=?

*A* $\sigma$
*B* $\sigma\sqrt{2/\pi}$
*C* $\sigma\sqrt{2\pi}$
*D* 0

21 Let $X_1$ and $X_2$ be two independent random variables so that the variances of $X_1$ and $X_2$ are $\sigma_1^2 = k$ and $\sigma_2^2 = 2$, respectively. Given that the variance of $Y=3X_2-X_1$ is 25, Find k = ?

*A* 7
*B* 5.4
*C* 6
*D* 3
*E* 8

22 Let $Y_1$ and $Y_2$ be two independent unbiased estimators of $\theta$. Say the variance of $Y_1$ is twice the variance of $Y_2$. Find the constants $k_1$ and $k_2$ so that $k_1Y_1+k_2Y_2$ is an unbiased estimator with smallest possible variance for such a linear combination. Find $(k_1, k_2)$=?

*A* (0.4, 0.6)
*B* (0, 1)
*C* (3/4, 1/4)
*D* (1/3, 2/3)
*E* (2/7, 5/7)

23 Bowl I contains 3 red chips and 7 blue chips. Bowls II contains 6 red chips and 4 blue chips. A bowl is selected at random and then 1 chip is drawn from this bowl. Compute the probability that this chip is red.

*A* 1/6
*B* 9/20
*C* 11/20
*D* 1/2

24 A market researcher is interested in determining the average income for families in Duval County, Florida. To accomplish this, she takes a random sample of 400 families from the county and uses the data gathered from these families to estimate the average income for families of the entire county. This process is an example of _____.

*A* descriptive statistics
*B* inferential statistics
*C* intermediate statistics
*D* a census

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25 Let $X_1$ and $X_2$ be observations of a random sample from a distribution with p.d.f. $f(x)=2x$, $0<x<1$, zero elsewhere. Evaluate the conditional probability $\Pr(X_1<X_2 \mid X_1<2X_2)$.

*A* 3/8
*B* 8/17
*C* 4/7
*D* 3/11

26 A 99% confidence interval estimate can be interpreted to mean that

*A* if all possible samples are taken and confidence interval estimates are developed, 99% of them would include the true population mean somewhere within their interval.
*B* we have 99% confidence that we have selected a sample whose interval does include the population mean.
*C* Both of the above.
*D* None of the above.

27 Suppose a 95% confidence interval has been constructed. If it is decided to take a larger sample and to decrease the confidence level of the interval, then the resulting interval width would _____. (Assume that the sample statistics gathered would not change very much for the new sample.)

*A* be larger than the current interval width
*B* be narrower than the current interval width
*C* be the same as the current interval width
*D* be unknown until actual sample sizes and reliability levels were determined

28 If a test of hypothesis has a Type I error probability of 0.01, we mean

*A* if the null hypothesis is true, we don't reject it 1% of the time.
*B* if the null hypothesis is true, we reject it 1% of the time.
*C* if the null hypothesis is false, we don't reject it 1% of the time.
*D* if the null hypothesis is false, we reject it 1% of the time.

29 A survey claims that 9 out of 10 doctors recommend aspirin for their patients with headaches. To test this claim against the alternative that the actual proportion of doctors who recommend aspirin is less than 0.90, a random sample of 100 doctors results in 83 who indicate that they recommend aspirin. The value of the test statistic in this problem is approximately equal to:_____

30 Which of the following statements is not true about the level of significance in a hypothesis test?

*A* The larger the level of significance, the more likely you are to reject the null hypothesis.
*B* The level of significance is the maximum risk we are willing to accept in making a Type I error.
*C* For a given level of significance, if the sample size is increased, the probability of committing a Type I error will increase.
*D* The significance level is another name for Type II error.

31 The power of a statistical test is

*A* the probability of not rejecting an alternative hypothesis when it is false.
*B* the probability of rejecting an alternative hypothesis when it is true.
*C* the probability of not rejecting a null hypothesis when it is true.
*D* the probability of rejecting a null hypothesis when it is false.

32 For a given level of significance level, if the sample size is increased, the probability of a Type II error?

*A* will decrease.
*B* will increase.
*C* will remain the same.
*D* cannot be determined.

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33 The t-Test for the difference between the means of 2 independent populations assumes that the respective

*A* sample sizes are equal.
*B* sample variances are equal.
*C* populations are approximately normal.
*D* All of the above.

34 A one-way ANOVA is to be performed. Independent random samples are selected from three different populations. The sample data are given in the table below.

| A | B | C |
|---|---|---|
| 9 | 9 | 4 |
| 6 | 2 | 4 |
| 6 | | 1 |
| | | 4 |

Compute the total sum of squares, SST= _____

35 A one-way ANOVA is performed to compare the means of three populations. The sample sizes are 9, 11, and 13. Determine the degrees of freedom for the F-statistic: _____

36 A one-way ANOVA is being performed. Suppose that SST = 82.7 and SSTR = 58.7. Find the value of the third sum of squares= _____

37 The least squares method minimizes which of the following?

*A* SSR
*B* SSE
*C* SST
*D* All of the above

38 A candy bar manufacturer is interested in trying to estimate how sales are influenced by the price of their product. To do this, the company randomly chooses 6 small cities and offers the candy bar at different prices. Using candy bar sales as the dependent variable, the company will conduct a simple linear regression on the data below:

| City | Price($) | Sales |
|---|---|---|
| River Falls | 1.30 | 100 |
| Hudson | 1.60 | 90 |
| Ellsworth | 1.80 | 90 |
| Prescott | 2.00 | 40 |
| Rock Elm | 2.40 | 38 |
| Stillwater | 2.90 | 32 |

Referring to the above table, what is the estimated slope parameter for the candy bar price and sales data: _____

39 In performing a regression analysis involving two numerical variables (Y is dependent variable and X is independent variable), we are assuming

*A* the variances of X and Y are equal.
*B* the variation around the line of regression is the same for each X value.
*C* that X and Y are independent.
*D* All of the above.

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40 The strength of the linear relationship between two numerical variables may be measured by the

*A* coefficient of correlation.
*B* scatter diagram.
*C* slope.
*D* intercept

41 If the correlation coefficient = 1, then

*A* all the data points must fall exactly on a straight line with a slope that equals 1.00.
*B* all the data points must fall exactly on a straight line with a negative slope.
*C* all the data points must fall exactly on a straight line with a positive slope.
*D* all the data points must fall exactly on a horizontal straight line with a zero slope.

42 Which of the following components in an ANOVA table are not additive?

*A* Sum of squares.
*B* Degree of freedom.
*C* Mean squares.
*D* None of the above.

43 In a one-way ANOVA, if the null hypothesis, $u_i = u$, i=1..n, is rejected, we may conclude that

*A* the population means are all different.
*B* the population means are all equal.
*C* most of the population means are different.
*D* the variation among sample means is greater than the variation within sample means.

44 Which of the followings is correct?

*A* the sample size in each independent sample must be the same if we are to test for differences between the means of 2 independent populations.
*B* When we test for differences between the means of 2 independent populations, we can only use a two-tailed test.
*C* When testing for differences between the means of 2 related populations, we can use either a one-tailed or two-tailed test.
*D* The F distribution is symmetric.

45 In testing for the differences between the means of 2 related populations, we assume that the differences follow a _____ distribution.

*A* normal
*B* F
*C* chi-square
*D* all of the above

46 In testing for differences between the means of 2 independent populations, the null hypothesis is:

*A* $H_0: U_1 - U_2 = 2$
*B* $H_0: U_1 - U_2 = 0$
*C* $H_0: U_1 - U_2 > 2$
*D* $H_0: U_1 - U_2 > 0$

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47 If we are testing for the difference between the means of 2 INDEPENDENT populations with samples of $n_1$= 20 and $n_2$= 20, the number of degrees of freedom is equal to

*A* 19
*B* 18
*C* 39
*D* 38

48 A car Company claims that its new car will average better than 30 miles per gallon in the city. How to formulate the hypotheses?

*A* $H_0: u \leq 30, H_a: u > 30$
*B* $H_0: u > 30, H_a: u \leq 30$
*C* $H_0: u = 30, H_a: u > 30$
*D* $H_0: u > 30, H_a: u = 30$

49 Suppose, in testing a hypothesis about a proportion, the p value is computed to be 0.034. If the chosen level of significance is 0.05, the null hypothesis should be

*A* rejected
*B* accepted
*C* not concluded
*D* accepted when sample size is large

50 If, as a result of a hypothesis test, we reject the null hypothesis when it is false, then we have committed

*A* a Type I error
*B* a Type II error
*C* a rejection error
*D* no error

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