

編號： 9

系所：統計學系學士班

科目：統計學

本試題是否可以使用計算機：可使用，不可使用（請命題老師勾選）1 Multiple Choice $2 \times 20 = 40\%$

1. X and Y are independently and identically distributed as a standard normal distribution. Which of the following is not correct?
 - A. $X - Y$ is normally distributed
 - B. $P(X \in [-1, 1]) = P(Y \in [-1, 1])$
 - C. If $X \in [-1, 1]$ then $Y \in [-1, 1]$.
 - D. $X - Y$ has the same variance as $X + Y$.
2. Refer to Question 1, what is the distribution of X/Y ?
 - A. χ_1^2
 - B. $F_{1,1}$
 - C. t_1
 - D. Exponential
3. X is a random variable with expected value 3 and standard deviation 2, what is the variance of $2X + 3$?
 - A. 9
 - B. 16
 - C. 19
 - D. 4
4. Let $X \sim Uniform(1, 5)$, $P(X = 2) = ?$
 - A. $1/5$
 - B. $1/4$
 - C. $1/2$
 - D. 0
5. Which of the following statements about Binomial distribution, $X \sim Bin(n, p)$, is(are) not correct?
 - i. The expected value of X is np .
 - ii. The standard deviation of X is $np(1 - p)$.
 - iii. The distribution is left-skewed when p is small.

A.i. B.ii. C.iii. D.i. and ii. (E)i. and iii. (F)ii. and iii. (G)All (H)None
6. Refer to Figure 1, what is the most possible value of the correlation between X and Y ?

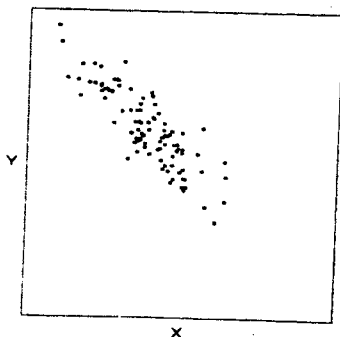


Figure 1:

- A. 0.2
- B. -0.2
- C. -0.8
- D. 0.8

(背面仍有題目,請繼續作答)

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7. If X and Y are mutually exclusive events with $P(X) = 0.295$, $P(Y) = 0.32$, then $P(X|Y) =$
- 0.0944
 - 0.6150
 - 1
 - 0

8. The median of a data set is greater than the mean, what is the most likely histogram of this data set in Figure 2?

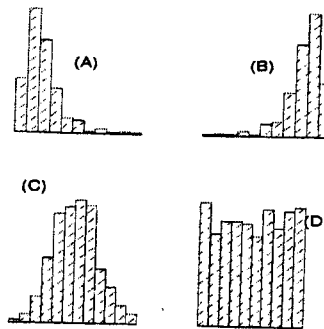


Figure 2:

9. If two events are independent, then
- they must be mutually exclusive
 - the sum of their probabilities must be equal to one
 - their intersection must be zero
 - None of these alternatives is correct.
10. If $P(A) = 0.2$, $P(B) = 0.4$ and $P(A \cap B) = 0.12$, then $P[(A^c \cap B^c)] =$
- 0.88
 - 0.6
 - 0.52
 - 0.48
11. 15% of the students in a school of Business Administration are majoring in Economics, 20% in Finance, 35% in Management, and 30% in Accounting. The graphical device which can be appropriately used to present these data is
- a histogram
 - a stem-and-leaf display
 - a scatter plot
 - a pie chart
12. Temperature is an example of a variable that uses
- the ratio scale
 - the interval scale
 - the ordinal scale
 - either the ratio or the ordinal scale

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13. What is the reason that we want to use t-distribution in the decision process of the two-sample t test?
- The sample sizes of the samples from two populations might not be the same.
 - The population distributions are not normal.
 - The population variances are not known.
 - None of the above is correct.
14. Which of the following does not need to be known in order to compute the p-value?
- knowledge of whether the test is one-tailed or two-tailed
 - the value of the test statistic
 - the level of significance
 - None of these alternatives is correct.
15. If the level of significance of a hypothesis test is raised from .01 to .05, the probability of a Type II error will generally
- will also increase from .01 to .05
 - will not change
 - will decrease
 - will increase
16. Independent simple random samples are taken to test the difference between the means of two populations. The sample sizes are $n_1 = 25$ and $n_2 = 35$. It is assumed that the variances of the populations are equal and that the populations are normally distributed. The sampling distribution of $(\bar{x}_1 - \bar{x}_2)$ follows the
- normal distribution
 - t distribution with 60 degrees of freedom
 - t distribution with 59 degrees of freedom
 - t distribution with 58 degrees of freedom
17. A sample of 20 cans of tomato juice showed a standard deviation of 0.4 ounces. What is the sampling distribution of the sample variance?
- Normal distribution
 - Chi-square distribution
 - F distribution
 - t distribution
18. If the null hypothesis is correct in a one-way ANOVA, then
- Both SSE and SSTR are unbiased estimators for σ^2
 - The value of MSTR is expected to be larger than MSE
 - Both of MSTR and MSE are unbiased estimators for σ^2
 - The value of MSE is expected to be larger than the value of MSTR, so that the value of F can be small enough.
19. Which of the following statements is correct?
- The maximum value of a distribution function is one, no matter what kind of distribution it represents.
 - The maximum value of the density function cannot be larger than one
 - Variance is a unit-free measurement of dispersion
 - If $X \sim N(\mu, \sigma^2)$, then the maximum value of $P(X = c)$ happens when $c = \mu$.
20. Based on Chebyshev's Theorem, what is the least proportion of data values must be within ± 2 standard deviations of the mean?
- about 89% if the data is roughly bell-shaped.
 - about 89%.
 - about 75% if the data is roughly bell-shaped.
 - about 75%.

(背面仍有題目,請繼續作答)

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2 Fill in the Blanks $4\% \times 15 = 60\%$

- The value of $F_{m,n}^{0.95}$ is equal to a , then $F_{n,m}^{0.05}$ is equal to A ?
- One would like to fit a simple regression model of

$$y = \beta_0 + \beta_1 \cdot x + \epsilon,$$

where

$$\epsilon_i \stackrel{iid}{\sim} N(0, \sigma^2).$$

5 sampling units were selected and the descriptive statistics of x and y are summarized as the following table

	Sample Mean	Sample STD.
x	57	2.74
y	126.2	20.98

with the sample correlation coefficient of 0.905. Please help him to build this model. (Round your answer to the second digit.)

Predictor	Coef	SE Coef	T	P
Constant	<u> B </u>			
X	<u> C </u>		<u> D </u>	0.025

R-Square = E %

Analysis of Variance

Source	DF	SS	MS	F	P
Regression		<u> F </u>		<u> I </u>	<u> J </u>
Residual Error		<u> G </u>			
Total		<u> H </u>			

- One wants to examine if the mean-levels of three populations are equal ($\alpha = 0.05$). He collected samples from each of these three populations, and obtain the following sample statistics,

i	1	2	3
n_i	6	6	6
\bar{x}_i	10	6	9
s_i^2	14	14	14

then

- What is the value of SSE K ?
- What is the value of SSB L ?
- What is the value of the test statistics M ?
- What is the distribution you need to compare the test statistic with? N ?
- What is the value of the overall sample variance of these 18 observations O ?