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2

PYC304-C
01/02 2007

SECTION A

ANSWER THE FOLLOWING SEVENTY MULTIPLE CHOICE QUESTIONS ON THE MARK READING SHEET. READ THE ATTACHED INSTRUCTIONS AND FOLLOW THEM CAREFULLY.

Question 1

A masters student in psychology plans to study human consciousness, following the recent publication of Watson's theory about the nature of consciousness. The main aim of the research will probably be to empirically -----

- 1. test predictions based on Watson's theory
- 2. test Watson's theory so that it can be accepted or rejected as a whole
- 3. study consciousness with a view to understanding, predicting and controlling it

Question 2

A theory can be described as an interdependent set of ----- relations between -----

- 1. proposed, constructs
- 2. empirical, hypotheses
- 3. verified, variables

Question 3

A psychologist conducts a study in which she measures the reaction times of students doing a psychometric test. She proceeds from the assumption that reaction time correlates with intelligence. In this study 'intelligence' is the -----

- 1. indicator
- 2. latent variable
- 3. manifest variable

Question 4

The building blocks of psychological theories are most accurately described as -----

- 1. concepts
- 2. constructs
- 3. variables

3

PYC304-C
01/02 2007

Question 5

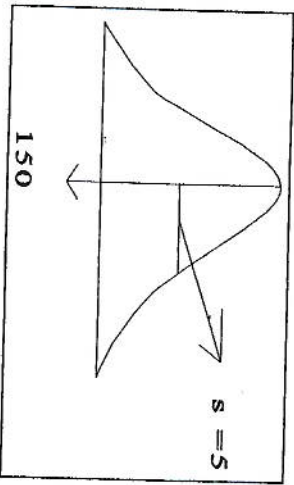
A measurement model of attention deficit disorder relates this ----- to its -----

- 1. construct, intervening variables
- 2. hypothetical variable, observable instances
- 3. referent, manifestations

Question 6

A construct may be a -----

- 1. hypothetical relation between two or more variables.
- 2. hypothetical aspect of humans that we wish to investigate.
- 3. testable prediction derived from a theory of human behaviour.



Question 7

Study the following figure of the normal curve:

What is the size of the area under the curve, to the right side of the average?

- 1. 100%
- 2. 0,50
- 3. 5

operationally defined variable is - - - - -

- abstract
- latent
- observable

question 9

patients' level of anxiety is reduced by psychotherapy" is - - - - -

- an observed relation between two variables
- a theoretical hypothesis
- an operational hypothesis

question 10

an explanation of size perception in the natural environment indicates how the estimated size of a distant object is affected by its true size, distance from the observer, and transparency of the atmosphere. He decides to investigate whether estimated size increases with haziness.

estimated size increases with haziness" is - - - - -

- an observed relation between two variables
- a research hypothesis
- an operational definition

question 11

one that a researcher believes that education plays a role in promotion. Which one of the following is the most appropriate operational hypothesis?

- Education plays a role in deciding on the promotion of employees at Computer Solutions Inc.
- Employees with higher levels of education earn more than employees with lower levels of education at Computer Solutions Inc.
- Computer Solutions Inc.
- Employees with higher levels of education are more likely to be promoted at Computer Solutions Inc. than employees with lower levels of education at corresponding post levels.

question 12

mental age of child number one is eight years". In this statement "mental age" is a(n) - - - - -, whereas "years" is a(n) - - - - -.

- variable; value of that variable
- construct; latent instance of that construct
- indicator; numerical value of that indicator

[TURNOVER]

Question 13

"Patients receiving psychotherapy are expected to score lower on the Manifest Anxiety Scale than patients not receiving psychotherapy" is - - - - -

- 1. a statistical hypothesis *independent*
- 2. a theoretical hypothesis *homoecologic*
- 3. an experimental hypothesis

Question 14

Suppose that over the years 10 000 students wrote the examinations in PYC 304-C and that 6000 of them passed, of which 300 obtained exactly 50%. This means that for randomly selected students the probability of obtaining exactly 50% is - - - - - while the probability of obtaining 50% or more is - - - - -

- 1. 0,60; 0,03
- 2. 0,05; 0,60
- 3. 0,03; 0,60

Question 15

Why is the central limit theorem of importance in inferential statistics?

- 1. Because it informs us how sampling error will increase as the population increases
- 2. Because it tells us that sampling error will begin to approximate a normal distribution as samples grow larger
- 3. Because it shows that the sampling distributions of certain sampling statistics will approach a normal distribution as sample sizes increase. *page 53*

Question 16

A class of 10 boys and 11 girls, including Mary and her friend Elizabeth, chooses a class representative by writing the names of everybody in the class on slips of paper, putting these into a box and asking their teacher to draw one name blindly.

What is the probability that EITHER Mary OR Elizabeth will be selected?

- 1. 2/21
- 2. 2/11
- 3. 2/19

Question 17

The expression " $0,05 \leq p \leq 0,10$ " denotes a probability value - - - - -

- 1. somewhere in the range 0,05 to 0,10
- 2. larger than or equal to 0,10; or smaller than or equal to 0,05
- 3. larger than 0,05 and smaller than 0,10

[TURNOVER]

Question 18

6

PYC304-C
01/02 2007

A probability distribution of the ages in months of South African Grade 1 children indicates for each ----- what the corresponding ----- is.

1. child; age of that child
2. age in months; number of children of that age
3. age in months; relative frequency at that age

Question 19

"Arithmetic ability is measured by the number of simple sums a person can do correctly in two minutes." In this scenario "arithmetic ability" is -----, and "the number of sums done correctly" is -----.

1. a manifest variable; an observable consequence
2. a factor; a hidden variable
3. a latent variable; an empirical consequence

Question 20

All normal distributions are ----- and -----.

- asymptotic; continuous
- symmetrical; have a mean of zero
- bell-shaped; have the same standard deviation

Question 21

The scale along the X-axis of the standard normal distribution indicates -----.

1. probabilities
2. the mean of the distribution
3. the number of standard deviations below and above the mean

Question 22

In scored 15 in English (class mean 12, standard deviation 3) and 18 in Geography (class mean 13, standard deviation 5). Use z-scores to decide which statement is true: Relative to the rest of his class John does -----.

- better in English than in Geography.
- equally well in English and Geography.
- better in Geography than in English.

[TURNOVER]

Question 23

7

PYC304-C
01/02 2007

The mean and standard deviation of a set of test scores are 20 and 8 respectively. What is the z-score corresponding to a test score of 14?

1. 6
2. 0,75
3. -0,75

Question 24

Suppose the height of military recruits is distributed normally with a mean of 1750 mm and a standard deviation of 50 mm. Drawing repeated samples of 25 recruits each we expect the standard deviation of the sample means to be about ----- mm.

1. 2
2. 10
3. 50

Question 25

The sampling error of the mean will be smaller in cases where the -----.

1. sample is larger and the standard deviation of the population smaller
2. population is larger and the variability of the scores in the sample is smaller
3. sample mean is smaller

Question 26

Which of the following assumptions do we make when applying a statistical test?

1. That the null hypothesis is true
2. That the alternative hypothesis is true
3. That the null hypothesis is false

Question 27

Lisa is a human resource consultant and her boss asks her to test if the employees in their company (population A) have a more positive attitude towards work than the average worker in South Africa (population B). Lisa decides to use a standardized test which measures work attitude (a high score indicates a positive attitude) with a mean score of 120 for the population (population B). Which of the following procedures should Lisa follow to set up her sample data?

- She should draw -----.
- 1. a random sample from both population A and B
- 2. a random sample from population A
- 3. two random samples from population A

[TURNOVER]

Base your answers to Questions 28 to 29 on the following hypothesis:

"The mean extroversion score on the Eysenck Personality Questionnaire (EPQ) of women who support abortion is higher than that of women who oppose it."

Question 28

How would you describe the research population(s)?

- 1. Women who support and women who oppose abortion.
- 2. All women.
- 3. Women who completed the EPQ.

Question 29

Testing the above prediction will require a ----- statistical test.

- 1. non-directional
- 2. two-tailed
- 3. directional

Question 30

The hypothesis "H₁: μ is not equal to 50" is a ----- hypothesis and requires a ----- statistical test.

- 1. non-directional; one-tailed
- 2. non-directional; two-tailed
- 3. directional; two-tailed

Question 31

The level of significance is a -----.

- 1. p-value under H₀
- 2. special test statistic
- 3. type II error

Question 32

When a statistical test yields a very small p-value, we know that the sample result is very -----.

- 1. likely under the null hypothesis
- 2. unlikely under the alternative hypothesis
- 3. unlikely under the null hypothesis

Page 77

Question 33

If we assume the alternative hypothesis: "The population mean is smaller than 50", which one of the following statements is true of the sampling distribution of the mean?

- 1. It is assumed to be the same as under the null hypothesis
- 2. It cannot be derived
- 3. It is assumed to correspond to the lower half of a normal distribution

Question 34

A type I error occurs when -----

- 1. the null hypothesis is wrongly rejected
- 2. the null hypothesis is wrongly not rejected
- 3. the alternative hypothesis is wrongly rejected

Question 35

The level of significance of a study is set by the researcher to -----.

- 1. control the type I error
- 2. control the type II error
- 3. control the p-value under H₀

Question 36

When applying a statistical test, if the p-value is smaller than the level of significance we ----- the alternative hypothesis.

- 1. accept
- 2. reject
- 3. fail to reject

Question 37

When applying a z-test to compare a sample mean to a known population mean, what do we call the calculated z-value?

- 1. A test statistic
- 2. A sample statistic
- 3. A population parameter

Page 80

Question 47

Which is the appropriate test statistic to calculate?

1. The z-statistic for the mean of a single sample
2. The t-statistic for the difference between the means of two independent samples
3. The t-statistic for the mean of a single sample

Question 48

You wish to test the hypothesis that the majority of persons aged 70 years or more are females. Using registers of pensioners you obtain a random sample of 250 persons aged 70 or more and find that 150 of them are female.

Which are the appropriate statistical hypotheses for the analysis of your result?

1. $H_0: P \text{ equals } 0,5; H_1: P \text{ is larger than } 0,5$
2. $H_0: \mu \text{ equals } 70; H_1: \mu \text{ is larger than } 70$
3. $H_0: P \text{ equals } 0,5; H_1: P \text{ is not equal to } 0,5$

Question 49

A researcher draws a single random sample from a population to test his hypothesis about the mean population score on a psychological test. Scores on this test are distributed normally in the general population with a known mean but an unknown standard deviation. Which test statistic should the researcher calculate to test his hypothesis?

1. The t-statistic for the mean of a single sample
2. The z-statistic for the mean of a single sample
3. The standard deviation of the sampling distribution of the mean of a single sample

Question 50

To validate a new depression scale a researcher applies it to 50 patients diagnosed with depression and 50 patients diagnosed with stress. She predicts that the depression sample will score higher (more depression) than the stress sample. The mean scores of the two samples are found to be 30 (standard deviation 10) and 25 (standard deviation 10) respectively.

Which is an appropriate alternative hypothesis for the analysis of the results?

1. $\mu > 25$
2. The population mean of the difference scores is larger than 25
3. $\mu_1 > \mu_2$

Question 51

A researcher is comparing the following hypotheses:

- $H_0: \mu_1 = \mu_2$
- $H_1: \mu_1 > \mu_2$

Her results derived from a random sample shows that the mean sample score for the first group is less than the mean sample score for group two (i.e., $\bar{X}_1 < \bar{X}_2$). What may she conclude?

1. she needs to calculate the relevant p-value before making a conclusion
2. she can reject H_0
3. she cannot reject H_0

Base your answers to Questions 52 to 53 on the following scenario:

To test the efficacy of psychotherapy aimed at relieving depression, a researcher applies a depression scale to 50 depressed patients at the start and again at the end of their treatment, predicting that the latter scores will be lower (reflecting less depression). Scores on his depression scale among the general population have a mean of 30 and a standard deviation of 10.

Question 52

Which constructs are related to one another by the research hypothesis?

1. Psychotherapy; depression.
2. Depression before psychotherapy; depression after psychotherapy.
3. Depression in the experimental group; depression in the general population; the presence/absence of psychotherapy.

Question 53

Which is an appropriate null hypothesis for the analysis of the results?

1. $\mu = 30$
2. $H_1 = H_2$

The population mean of the difference scores equals zero.

Question 54

The sample size (n) increases -----

a smaller value of the Pearson correlation coefficient r will reach significance
a larger value of the Pearson correlation coefficient r is required before the result will be significant
there are no implications for the significance of the value of the Pearson correlation coefficient r

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Question 59

The difference score indicating differences between each pair of results in two samples ($d = X_2 - X_1$) is used in the calculation of the test statistic in the case of - - - - -.

1. the t-test for independent samples
2. the t-test for dependent samples
3. the Pearson correlation coefficient

Base your answers to Questions 60 to 61 on the following scenario:

A marriage counsellor expects that second marriages more often end in divorce than first marriages. She tests this hypothesis by following up 200 marriages that were all registered five years ago, 50 in which at least one partner had been married before and 150 in which neither partner had been married before. Of the 150 first marriages 30 ended in divorce, of the 50 second marriages 10 ended in divorce.

Question 60

Which constructs feature in the researcher's hypothesis?

1. Type of marriage (first/second); divorced (yes/no)
2. First marriage; second marriage; divorced (yes/no)
3. First marriage; second marriage; divorced; not divorced

Question 61

What are the requirements with regard to a statistical test for the results obtained?

1. A one-tailed statistical test is required
2. A two-tailed statistical test is required
3. No statistical test is required

Question 62

A negative correlation between variables X and Y implies that persons scoring low on X will generally score - - - - - on Y.

1. low
2. either low or high
3. high

Question 55

A researcher predicts that a motivational talk will improve the work performance of men. However, he finds that the mean work performance of his sample of 20 men is actually poorer after the motivational talk than before. What statistical test is required to analyse his results?

1. A one-tailed statistical test is required.
2. A two-tailed statistical test is required.
3. No statistical test is required.

Base your answers to Questions 56 to 58 on the following scenario:

A teacher investigates the effect of extra classes on the performance of pupils in mathematics. A group of 20 pupils receives the extra classes while a control group of 20 pupils receives singing lessons. For each of the 40 pupils the teacher calculates the increase or decrease in his or her mathematics performance by comparing the marks obtained in an examination before the extra classes to the marks obtained in an examination after the extra classes.

Question 56

Which research design should the teacher use?

1. A single-sample groups design
2. A two-sample groups design
3. A four-sample groups design

Question 57

Which is the most appropriate research hypothesis for the teacher to test?

1. The mean mathematics score after the extra classes is larger than before the extra classes for the experimental group
2. The mean mathematics difference score (after classes minus before classes) of the experimental group is larger than that of the control group
3. The mean mathematics score after extra classes is higher for the experimental group than for the control group

Question 58

Which is the appropriate test statistic to be calculated when analysing the results of this research?

1. The t-statistic for the difference between the means of two independent samples
2. The t-statistic for the difference between the means of two dependent samples
3. The t-statistic for the mean difference score of a single sample

Question 63

A researcher wants to determine whether a relationship exists between students' general level of anxiety and their exam results. He presents each student from a random sample with a general anxiety scale just before they are to write an important exam. Which of the following is the most appropriate test statistic to use to determine whether a relationship exists between the two variables (anxiety level and exam results)?

1. t-test
2. Pearson's r test statistic
3. chi-square test (χ^2)

Question 64

Which of the following can take on a value of -0,05?

1. a probability
2. a level of significance
3. a correlation coefficient.

Question 65

A positive correlation between variables X and Y implies that persons scoring low on X will generally score - on Y.

1. high
2. low
3. either high or low

Question 66

A researcher finds that the correlation coefficient between the ages and heights of a sample of 10 children is positive, but not significantly different from zero at the 0,05 level of significance. To improve her chances of obtaining a significant correlation between these variables the researcher could repeat the research using

1. more variables
2. more children
3. a lower level of significance

Question 67

A politician asks his audience of 100 whether they will vote for him. Of the 60 men present 33 say yes, of the 40 women present 18 say yes. When analysing these results the two sets of answers should be regarded as

1. coming from the same population
2. independent
3. having been randomly assigned to the two groups

Question 68

A researcher hypothesizes that the drug treatment of hospitalised schizophrenic patients improves their mental alertness. He studies a random sample of 27 such patients and finds a correlation coefficient of 0,6 between the number of days of drug treatment and patients' scores on the Mental Alertness Test.

Which is an appropriate alternative hypothesis for this research?

1. $\mu_1 = \mu_2$
2. The correlation coefficient in the population exceeds zero
3. P is not equal to zero.

Question 69

A researcher obtains a correlation coefficient of 0,40 between IQ scores and examination marks in a random sample of 10 PYC 304 students, and again a correlation coefficient of 0,40 between the same two variables in another random sample of 100 PYC 304 students. Which of these two correlation coefficients is the more likely to differ significantly from zero under the null hypothesis?

1. That obtained on the smaller sample
2. Both are equally likely to be significant
3. That obtained on the larger sample

Question 70

Which of the following can never have a value of -0,5?

1. The chi-square statistic
2. The z-statistic
3. The Pearson correlation coefficient

END OF EXAM PAPER

[TOTAL: 70]

NB: Your mark out of 70 will be converted to a percentage (100 marks) by the computer.

Question 38

A researcher hypothesizes that babies born prematurely will be somewhat less intelligent as young adults than their peers. She uses the records of various maternity hospitals to identify a random sample of 25 persons who are now young adults, but who were born more than four weeks prematurely. She measures the IQ of each, using the SAWAIS. (IQ scores on this test are distributed normally in the general population, with a mean of 100 and a standard deviation of 15.) Suppose she finds that the mean IQ score of her sample is 97.9 and the standard deviation of the scores is 17.

Which research design did the researcher use?

- 1. Correlational design
- 2. Single-sample groups design
- 3. Two-sample groups design

Question 39

Which of the following refers to the probability of making a Type II error?

- 1. Significance level
- 2. Beta or β
- 3. p -value

Question 40

A type II error occurs when -----

- 1. the null hypothesis is wrongly rejected.
- 2. the null hypothesis is wrongly not rejected.
- 3. the alternative hypothesis is wrongly accepted.

Question 41

When applying a statistical test, if the p -value is larger than the level of significance we ----- the null hypothesis.

- 1. accept
- 2. do not reject
- 3. reject

Question 42

The higher we set the level of significance (α), the greater the probability of -----

- 1. a type I error
- 2. a type II error
- 3. not rejecting the null hypothesis

Page 82

Question 43

Which of the following assumptions do we make when applying a statistical test?

- 1. That the null hypothesis is true
- 2. That the alternative hypothesis is true
- 3. That the null hypothesis is false

Question 44

If a research result looks psychologically important but is found to be not statistically significant, what might the researcher consider doing when repeating the research?

- 1. Use a larger sample.
- 2. Set a lower level of significance.
- 3. Use a more powerful statistical test.

Question 45

The nature of the research process and of statistical analysis is such that statistically significant results are -----

- 1. also psychologically important
- 2. psychologically important if a high level of significance was used
- 3. not necessarily psychologically important

Base your answers to Questions 46 to 47 on the following scenario:

A researcher hypothesizes that chess-playing students are better at non-verbal reasoning than students in general. He draws a random sample of 25 students from the members of the chess clubs of South African universities and measures their non-verbal reasoning ability by means of a test developed for this purpose. The scores of a large group of students on this test were found in earlier research to be distributed normally with a mean of 20. Suppose the researcher finds that the mean score of his sample is 20, and the standard deviation of the scores is 6.

Question 46

Which are the appropriate statistical hypotheses for testing the researcher's hypothesis?

- 1. $H_0: \mu$ is not equal to 20; $H_1: \mu$ is larger than 20
- 2. $H_0: \mu$ equals 20; $H_1: \mu$ is larger than 20
- 3. $H_0: \mu$ equals 20; $H_1: \mu$ is not equal to 20

Page 84