SAN DIEGO STATE UNIVERSITY

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MEMORANDUM

To: Incoming SDSU SPH Master students
From: Biostatistics faculty
Date: Spring 2025
Subject: Preparation for PH 602 – Biostatistics core course

Biostatistics and mathematics provide the foundational tools and methodologies needed to analyze and interpret data, which is central to understanding population characteristics, health trends, and determinants.

It is **highly recommended** (although **not required**) that all students have adequate preparation in statistics prior to enrollment in PH 602 Biostatistics, which is a required core course for all MPH students. It is in your best interest to prepare yourself for the quantitative material in PH 602. To help you gauge your current knowledge of introductory statistics, a sample exam is attached. We strongly suggest you take the exam to determine your readiness for graduate- level biostatistics, and you should take appropriate action if you do not achieve a satisfactory score.

If you find that you have not achieved a satisfactory score on the sample exam (or if you wish to refresh your knowledge of the subject), it is strongly recommended that you prepare for PH 602 by studying Chapters 1, 2, and 3 of *High-Yield Biostatistics* by Anthony N. Glaser.

Alternatively, a statistics course may be taken at SDSU or a community college in preparation for the school year. Courses such as SDSU STAT 250, Math 119 at Mesa, Miramar, or City College, Math 160 at Grossmont College, Math 120 at Palomar College, or other equivalent courses, are acceptable. A list of courses at SDSU is provided in the Appendix table of this memorandum. For courses at a community college, please consult the community college's class schedule.

Any questions regarding satisfactory quantitative preparation for PH 602 should be directed to Dr. Yu Ni at yni5@sdsu.edu.

Biostatistics Competency Test

School of Public Health

San Diego State University

There are 29 questions with 30 sub-questions in total (Q16 has Q16a and Q16b). To pass this test, you will need to get 18 questions correct.

You have a maximum of **1.5 hours** to complete this test.

1. What temperature is halfway between -18 ℃ and 31 ℃?
   A. 24 ℃
   B. -24.5 ℃
   C. 6.5 ℃
   D. -6.5 ℃
   E. 7 ℃

2. Simplify the following expression using positive exponents: $\frac{r^7}{t^8} \times \frac{t^4}{r^2}$
   A. $\frac{r^5}{t^{12}}$
   B. $\frac{r^9}{t^{12}}$
   C. $\frac{r^9}{t^4}$
   D. $\frac{r^5}{t^4}$
   E. $\frac{r^9}{t^{12}}$

3. What is $log_4(64) - log_5(625)$?
   A. -1
   B. 0
   C. 1
   D. 2
   E. -2

4. a and b are integers such that $a^3 = b^4$.
   A. a is greater than b.
   B. b is greater than a.
   C. a and b are equal.
   D. The relationship cannot be determined from the information given.

5. If $2X - \frac{1}{3}Y = A$, what is the value of Y if $X = 10$ and $A = 22$?
   A. 6
   B. -6
   C. 0.67
   D. -0.67
   E. 12

6. Evaluate the function, $f(x) = ((3x^2 - 4)(4x - 3) - 10)/5$, for $x = 2$
   A. 38
   B. 24
   C. 12
   D. 8
   E. 6

7. If $x_1 = 1, x_2 = 2, x_3 = 4, x_4 = 6,$ what is $\sum_{i=1}^{4}(x_i - 4)^2$?
   A. 13
   B. 15
   C. 16

D. 17
E. 21

8. If $\sqrt{x+6}+\sqrt{x+1}=5$, what is the value of x?
   A. 1
   B. 2
   C. 3
   D. 4
   E. 5

9. Two sets, Set A: $\{-9,-2,y^2,9,16,17\}$ and Set B: $\{-1,0,-2y,12,14,15\}$, have their elements arranged in ascending order, and have equal median values. What is the value of y?
   A. -3
   B. -2
   C. -1
   D. 0
   E. 1

10. If $x^2y^3<0$, which of the following is true?
    A. $x>0$
    B. $xy<0$
    C. $xy>0$
    D. $x^2y<0$
    E. $xy^2>0$

11. When comparing the maximum value of $\frac{1}{3+x^2}$ to $\frac{1}{3}$, over all possible real numbers x, which of the following is true?
    A. The maximum value of $\frac{1}{3+x^2}$ is greater.
    B. $\frac{1}{3}$ is greater.
    C. The two quantities are equal.
    D. The relationship cannot be determined from the information given

12. If x and y are both positive, and $x<y$, then
    A. $\frac{1}{x}<\frac{1}{y}$
    B. $\frac{1}{x}>\frac{1}{y}$
    C. $\frac{1}{x}=\frac{1}{y}$
    D. The relationship cannot be determined from the information given.

13. Suppose that on the basis of previous knowledge it is known that a woman with breast cancer has a chance of 90 in 100 of surviving five years. If two women with breast cancer are chosen at random, what is the probability that **neither** of them will survive five years?
    A. 0.01
    B. 0.04
    C. 0.10
    D. 0.20

E. 0.81

14. The ten letters of the word “STATISTICS” are written on like slips of paper. These slips are placed in a box and thoroughly mixed. One slip is drawn. What is the probability that the slip **does not** have a “T” on it?
    A. 3/10
    B. 9/10
    C. 1/5
    D. 4/5
    E. 7/10

15. At an iPhone photo competition, there are six finalists. One of the finalists will be awarded “Technical Excellence”, and another finalist will be awarded “Best Storytelling”. In how many different ways could the two awards be given out?
    A. 6 ways
    B. 5 ways
    C. 30 ways
    D. 36 ways
    E. 11 ways

16. In a study of 2000 patients *suspected* of having congenital heart disease, 310 were found to be normal of whom 16 had complained of chest pain. Of the entire group of 2000 patients, 68 complained of chest pain. Please answer the following two questions (i.e., Q16a and Q16b) using this information.

    16.a. What is the probability of chest pain in a patient who turns out to be normal?
    A. 68/2000
    B. 16/2000
    C. 310/2000
    D. 16/310
    E. 16/68

    16.b. What is the probability of a patient being normal given the presence of chest pain?
    A. 68/2000
    B. 16/2000
    C. 310/2000
    D. 16/310
    E. 16/68

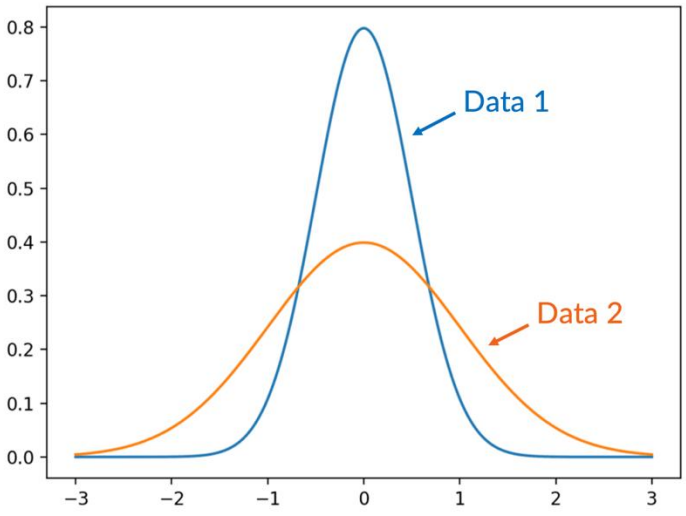
17. Suppose that 35% of all Fijian women exercise at least 5 hours per week and that 60% of all Fijian women are overweight. Further suppose that 20% of all overweight Fijian women exercise at least 5 hours per week. What proportion of Fijian women are overweight and exercise at least 5 hours per week?
    A. 0.35
    B. 0.60
    C. 0.20
    D. 0.12
    E. 0.07

18. Ms. Smith and Mr. Jones are both members of a class consisting of 45 men and 30 women. If random samples of 10 men and 10 women are chosen from the class, which of the following statements are true?
    A. Ms. Smith is more likely to be chosen than is Mr. Jones.
    B. Ms. Smith is less likely to be chosen than is Mr. Jones.
    C. Ms. Smith and Mr. Jones are equally likely to be chosen.
    D. Neither Ms. Smith nor Mr. Jones will be chosen.

19. For a set of data with a normal distribution, what is the relationship among the following measures of central tendency: arithmetic mean, median, and mode?
    A. mean > median > mode
    B. mean < median < mode
    C. mean > mode > median
    D. mean < median < mode
    E. mean = median = mode

20. Which of following are all measures of variability (i.e. the spread) of a set of data?
    A. Mean, mode, and median
    B. Range, standard deviation, and mode
    C. Median, variance, and mode
    D. Range, standard deviation, and variance
    E. Median, standard deviation, and interquartile range

21. The distributions of two sets of data are shown below. Which of the following statements is true regarding the central location and spread of the two distributions?



    A. mean of Data 1 > mean of Data 2; variance of Data 1 < variance of Data 2
    B. mean of Data 1 < mean of Data 2; variance of Data 1 < variance of Data 2
    C. mean of Data 1 > mean of Data 2; variance of Data 1 = variance of Data 2
    D. mean of Data 1 = mean of Data 2; variance of Data 1 < variance of Data 2
    E. mean of Data 1 = mean of Data 2; variance of Data 1 > variance of Data 2

22. Which measure of central tendency, the arithmetic mean, the median, or the mode, will be most affected by extremely large or small observations?
    A. median
    B. mode
    C. mean
    D. All of the above will be affected equally
    E. None of the above will be affected

23. A hospital will accept an order of syringes from its supplier if 10% or fewer are defective. One hundred randomly chosen syringes are inspected and 16 defectives are found. The estimated proportion of defective syringes in the entire lot is:
    A. 0.10
    B. 0.16
    C. 0.016
    D. 0.0016
    E. 1.6

24. The HIV antibody test has a specificity of 98.5%, which means that for individuals who truly do not have HIV, 98.5% will be tested as negative. There are around one million people in the U.S. who have HIV. If the entire U.S. population of 300 million were screened with the HIV antibody test, approximately how many would be expected to have a false positive test results (i.e., the number of individuals who do not have the disease but incorrectly test positive)?
    A. 1 million
    B. 2 million
    C. 4.5 million
    D. 299 million
    E. 294.5 million

25. A company consults you to assess the risk of carpal tunnel syndrome among its employees. You interview 1000 employees to inquire about their work status and whether they developed carpal tunnel syndrome since working for the company. Results are shown below:

	Number of employees	New cases of carpal tunnel syndrome
Full-time employees	800	25
Part-time employees	200	6

    The CEO of the company is concerned that the occurrence of carpal tunnel syndrome is considerably higher than other companies in the same field. Which denominator would permit the most accurate comparison of the occurrence of carpal tunnel syndrome between this company and the others?
    A. total number of employees
    B. number of person hours at work
    C. number of carpal tunnel syndrome cases
    D. number of sedentary hours both at work and at home
    E. population of the city that the company is located

26. In random sampling, every member in the population has an equal and independent chance of being selected. What is **NOT** an advantage of using random sampling?
    A. Easy and convenient to implement with a low cost
    B. Promotes fairness and equality in the sampling process
    C. Reduces bias from self-selection
    D. Ensures that the sample accurately reflects the diversity and characteristics of the population
    E. Generates results that can be applied to the entire population

27. Which of the following statements defines the 97.5^{th} percentile value for a data sample, regardless of the sample data distribution?
    A. The value that is 97.5% larger than the sample mean.
    B. The value such that 2.5% of the sample observations are larger than this value, and 97.5% of the sample observations are smaller than this value.
    C. The value such that 97.5% of the sample observations are larger than this value, and 2.5% of the sample observations are smaller than this value.
    D. This value always corresponds to the sample mean plus 2 standard deviations.

28. 500 randomly selected university students were recruited in a study about smoking status and stress levels. Participants were asked to rate their stress levels on a scale of 0 – 100 with 0 indicating no stress. Students were also asked to disclose whether they were a non-smoker, a light smoker, or a heavy smoker.

    Of the 500 students, 75, 150, and 275 identified themselves as heavy smokers, light smokers, and non-smokers, respectively. The average stress level reported for heavy smokers, light smokers, and non-smokers was 60.4, 45.7, and 56.6, respectively. Based on these results, select the **incorrect** statement from below.

    A. On average, the stress level in heavy smokers was approximately 1.07 times as high as the stress level in non-smokers.
    B. On average, heavy smokers had a 14.7-point higher stress level than light smokers.
    C. On average, non-smokers had the lowest stress level among these three groups of students.
    D. If we combine heavy smokers and light smokers into a group called active smokers, the average stress level in these active smokers would be 50.6.

29. Which of the following is true about the sample mean?
    A. The sample mean will always equal the underlying population mean.
    B. The sample mean is the best estimate of the underlying population mean, based on the sample data.
    C. The sample mean tends to increase in value with increasing sample size.
    D. The sample mean tends to decrease in value with increasing sample size.

Biostatistics Competency Test Solutions

Q1: C
Q2: D
Q3: A
Q4: D
Q5: B
Q6: E
Q7: D
Q8: C
Q9: A
Q10: D
Q11: C
Q12: B
Q13: A
Q14: E
Q15: C
Q16a: D
Q16b: E
Q17: D
Q18: A
Q19: E
Q20: D
Q21: D
Q22: C
Q23: B
Q24: C
Q25: B
Q26: A
Q27: B
Q28: C
Q29: B

APPENDIX: Statistics Courses at SDSU

SDSU Summer 2025 | STAT 250				
Class	Day	Time	Room	Instructor
Tech Acts: 2066	ONLINE	ONLINE	N/A	Laura Scott
SDSU Fall 2025 | STAT 250				
Class	Day	Time	Room	Instructor
LRG LEC 7588	ONLINE	TBA	TBA	TBA
Tech Acts - 8277	Wed	1:00- 2:40	GMCS 421	TBA
Tech Acts - 7590	MON	1:00 - 2:40	GMCS 421	TBA
Tech Acts - 7591	TUES	9:00 - 10:40	GMCS 421	TBA
Tech Acts - 7593	WED	11:00 - 12:40	GMCS 421	TBA
Tech Acts - 7592	WED	9:00 - 10:40	GMCS 421	TBA
Tech Acts - 7589	MON	11:00-12:40	GMCS 421	TBA
Tech Acts - 7587	MON	9:00-10:40	GMCS 421	TBA

Consult community college course schedules for courses at community colleges.