

Quantitative Self-Test

Bios 600 UNC-CH

Students enrolling in Biostatistics 600 are expected to have a working knowledge of basic mathematics including algebra I and arithmetic. Typically, competency can be met through courses titled “Pre-calculus” or “College Algebra”. Depending on your recall of the material, you may be able to review these topics on your own.

Some of the topics you need to understand, before beginning Biostatistics 600 include:

- Familiarity with a scientific or graphing calculator
- Arithmetic: order of mathematical operations, topics involving fractions, decimals, square roots, percents and ratios
- Algebra: solving simple algebra equations and checking the solution, negative numbers, solving linear inequalities, word problems
- Other: basic properties of exponents and logarithms, graphing a line and identifying the slope and intercept, basic probability.

How to use this test:

The questions in this “quantitative self-test” cover many of the important topics listed above that students are expected to understand before enrolling in Biostatistics 600.

No specific grade for this test demonstrates preparedness; students should be comfortable with ALL concepts covered in this self-test with the only errors being “careless.”

Students who have difficulty completing this review are encouraged to review those topics that are problematic or enroll in a college algebra review course. For example, courses offered residentially at UNC-CH that would meet this expectation include MATH 110 (algebra) or 130 (pre-calculus).

Resources for reviewing math concepts:

- 1) A good, free mathematical review can be found as part of the GRE website. See www.ets.org/gre/revised_general/prepare/quantitative_reasoning/ and www.ets.org/s/gre/pdf/gre_math_review.pdf This downloadable pdf file has a nice review of basic mathematical concepts. Your emphasis should be on the sections on arithmetic, algebra and data analysis (not geometry).
- 2) www.khanacademy.org has excellent videos. Concentrate on these sections: “arithmetic and prealgebra” and “algebra”.
- 3) Many good review books are available including: The Complete Idiot’s Guide to Algebra (Michael Kelley), Algebra for Dummies (Sterling), Algebra Demystified: A Self Teaching Guide (Huettenmueller), Practical Algebra: A Self Teaching Guide (Selby), Painless Algebra (Long).

Complete the following problems **without using a calculator** :

1. Evaluate:

a) $\frac{1}{2} \div 3$

b) $\frac{1}{2} \div \left(\frac{-1}{4}\right)$

c) $7(3^2 - 4)$

d) 2^{-3}

e) $(3^2)^{-1}$

2. Evaluate and express your answer as a decimal:

a) $5 + \frac{3}{2} =$

b) $\frac{3}{4} - 2 =$

3. Simplify:

a) $8^{\frac{2}{3}} 2^{\frac{-1}{3}}$

b) $\sqrt{16x^6}$

c) $10^{\frac{1}{2}} 10^{\frac{3}{2}}$

4. Simplify:

a) $10x - (3x - (7x + 2))$

b) $\frac{\left(\frac{4}{5x}\right)}{\left(\frac{-2}{15x}\right)}$

5. Find the product:

a) $(4x+6)^2$

b) $(2x+1)(5x-8)$

c) $6x(3x^2 - 7x + 2)$

6. (Please write the fractions in the simplest form.)

a) Convert 35% to a fraction. Convert 35% to a decimal.

b) Convert 0.12 to a percent. Convert 0.12 to a fraction.

c) Convert $\frac{3}{5}$ to a percent. Convert $\frac{3}{5}$ to a decimal.

7. Solve for x .

a) $12x - 8 = -2$

b) $\frac{2x + 5}{10x + 3} = \frac{1}{3}$

8. a) What is $\frac{1}{3}$ of $\frac{3}{5}$?

b) What is 20% of 84?

c) 75% of what number is 36?

9. Your average so far in a class is 88. This average counts for 75% of your grade and the final exam counts for 25% of your grade. What do you need to make on the final exam for your course average to be at least 90?

10. A line contains the points (4,5) and (1, -1).

a) Find the equation of the line.

b) What is the slope of the line?

c) What is the y – intercept of the line?

d) Graph the line.

11. Consider the equation $y = 3x - 8$

a) Find y when $x = -1$.

b) Find x when $y = 2$.

12. a) Write using scientific notation: 0.0000683

b) Write in decimal form without scientific notation: 1.82×10^{-6}

13. Evaluate:

a) $\log_2 8 =$

b) $\ln \sqrt{e} =$

c) $e^{2 \ln 2}$

14. Simplify: $\ln 3x - \ln 9x$

15. Select the best answer:

I. $e \approx 2.718$ II. $e \approx 3.14$ III. $e = \ln(1)$

- a) I only is true
- b) II only is true
- c) III only is true
- d) I and III are true

16. The price of gas increased by 8% in June and another 15% in July. What was the total percentage increase from June 1 to July 31?

17. Approximately 30% of patients receiving a medication experience nausea.
- a) Suppose 2 patients are selected at random. Find the probability that both patients experience nausea.
 - b) Suppose 2 patients are selected at random. Find the probability that neither experience nausea.
 - c) Suppose 2 patients are selected at random. Find the probability that exactly one experiences nausea.
 - d) Suppose 2 patients are selected at random. Find the probability that at least one experiences nausea.