University of the State of New York.

37th Academic Examination.

Higher Algebra.

Monday, March 3, 1890—Time, 9:30 A. M. to 12:30 P. M., only.

44 credits, necessary to pass, 33.

1. Rationalize the denominator of the following fraction:
   \[ \frac{\sqrt{x - 4} \sqrt{x - 2}}{2 \sqrt{x + 2} \sqrt{x - 2}} \]
   3

2. Divide \( 6a^{-1} b^2 \) by \( -3ab^{-1} \) 2

3. Form the equation whose roots are \( \pm 3, \pm \sqrt{-13} \), and solve the equation 4

4. Solve \( \sqrt{x^2 - 3x + 5} - \sqrt{x^2 - 5x - 2} = 1 \) 3

5. Solve \( x^2 + y = 5 \) \((x - y)\).
   \[ x + y^2 = 2 (x - y) \] 4

6. Find two numbers such that their difference added to the difference of their squares shall make 150 and their sum added to the sum of their squares shall make 330 3

7. A traveler has a journey of 132 miles to perform. He goes 27 miles the first day, 24 the second, and so on, traveling 3 miles less each day than the day before. In how many days will he complete the journey? 3

8. Show that if, in a geometrical progression, each term be added to or subtracted from that next following, the sums or the remainders will form a geometrical progression 3

9. Show that \( \log. b \) to the base \( a \) multiplied by \( \log. a \) to the base \( b = 1 \) for any values of \( a \) and \( b \) 2

10. Find the 5th term of \( (1 - a^2)^{12} \) 3

11. If there are three routes between each successive two of the five cities, Boston, New York, Philadelphia, Baltimore, Washington, by how many routes could we travel from Boston to Washington? 3

12. Resolve the fraction \( \frac{5x - 12}{x^2 - 5x + 6} \) into partial fractions 2

13. Expand \( \frac{1 - z}{1 - 2x - 3x^2} \) into an infinite series 3

14. Find the value of \( z \) in \( 2^z = 16 \) when \( \log. 2 = .30103 \) 3

15. Required the three roots of the equation \( x^3 = a^3 \), or \( x^3 - a^3 = 0 \) 3