

22a

University of the State of New York

Examination Department

122d examination

ADVANCED ALGEBRA

Monday, June 11, 1894 — 9:15 a. m. to 12:15 p. m., only

100 credits, necessary to pass, 75

Answer 10 questions but no more. Division of groups is not allowed. If more than 10 questions are answered only the first 10 of these answers will be considered. Give each step of solution. Reduce fractions to lowest terms. Express final result in its simplest form and mark it Ans. Each complete answer will receive 10 credits.

1 Define *infinite series*, *imaginary quantity*, *progression*, *variation*, *logarithm*.

2 Prove that if two imaginary expressions are equal the real parts are equal and the imaginary parts are equal.

3 Reduce the following to its simplest form: $\frac{a+\sqrt{-b}}{a-\sqrt{-b}} + \frac{a-\sqrt{-b}}{a+\sqrt{-b}}$

4 Find the exact square root of $43+15\sqrt{8}$

5 Find the value of x in the following: $\sqrt{x+6} + \sqrt{x+1} = \sqrt{8x+1}$

6-7 Derive and state the rule for finding the number of permutations of n things taken r at a time.

8-9 Find the approximate fifth root of 31 by an application of the binomial formula.

10-11 Demonstrate the following: an equation whose coefficients are all integral that of the first term being unity can not have a rational fraction for a root.

12-13 Derive a method of transforming a complete equation into another whose second term is wanting.

14-15 State Sturm's theorem and show its application by finding the number and location of the real roots of the following:

$$x^4 - 4x^3 - 3x + 27 = 0$$