University of the State of New York

Examination Department

135TH EXAMINATION

ADVANCED ALGEBRA

Tuesday, March 24, 1896—9:15 a. m. to 12:15 p. m., only

100 *credits, necessary to pass,* 75

Answer 10 questions but **no more.** *If more than 10 questions are answered only the first 10 of these answers will be considered. Division of groups is not allowed. 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 *radical equation, root of an equation, imaginary quantity, characteristic of a logarithm, geometric series.*

2 Deduce the meaning of a^0 and of a^{-n}, n being integral or fractional.

3 Reduce 2, $\sqrt{3}$, $\sqrt[3]{5}$, $\sqrt[6]{6}$ and $\sqrt[6]{7}$ to equivalent radicals of the same degree.

4 Deduce a general method for finding the square root of $a \pm \sqrt{b}$.

5 In any system of logarithms what is the value of log 1? log base? log $\frac{1}{\text{base}}$? Of what numbers are the logarithms positive? of what numbers, negative?

6 State and prove the theorem of undetermined coefficien s.

7–8 An army is advancing at the rate of 12 miles a day when a detachment 55 miles in the rear is ordered to join it; how long will it take the detachment to do this if it advances 25 miles the first day, 24 the next, 23 the next and so on? Explain each answer.

9–10 Show by a general method that the successive convergents of a continued fraction are alternately less and greater than the true value of the fraction.

11 Derive the formula for the number of arrangements (permutations) of n different things, taken r at a time.

12–13 Expand $\frac{1-2x^2}{1+2x-3x^2}$ to *five* terms by the method of undetermined coefficients. Verify by division.

14 State what factors of 20 are roots of $x^3-8x^2+11x+20=0$

15 Find all the roots of $x^3-11x^2+43x-65=0$