University of the State of New York

Examination Department

138TH EXAMINATION

ADVANCED ALGEBRA

Tuesday, June 16, 1896—9:15 a. m. to 12:15 p. m., only

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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, logarithm, variation, series, exponential equation.*

2 Simplify $\sqrt{\frac{a+b}{a-b}\sqrt{\frac{a+b}{a-b}}} \times \sqrt[3]{\frac{a-b}{a+b}\sqrt{\frac{a-b}{a+b}}}$

3 If $\log 64 = 1$, what is $\log 32$? $\log \frac{1}{256}$? If $\log \frac{2}{5} = 1$, what is $\log \frac{25}{8}$? $\log \frac{16}{625}$? If $\log (-\frac{2}{3}) = 1$, what is $\log (-\frac{27}{8})$? $\log \frac{16}{81}$?

4–5 Prove that a quadratic equation can not have more than two roots.

6 Prove that if four quantities are in proportion they will be in proportion by composition and division.

7 What arithmetic series has the sum of n terms equal to n^2?

8 The difference between two numbers is 48; the arithmetic mean exceeds the geometric mean by 2. What are the numbers?

9–10 If s_1, s_2 and s_3 represent the sum of n, $2n$ and $3n$ terms of an arithmetic series respectively, prove that $s_3 = 3(s_2 - s_1)$.

11 Derive the formula for the number of selections (combinations) of r things formed from n things.

12–13 Resolve $\frac{x^2}{(x^2-1)(x-2)}$ into partial fractions.

14 Form an equation whose roots are 1, 2, 3, $\frac{1}{2}$ and $\frac{1}{3}$.

15 Two roots of $x^4 - 3x^3 - 14x^2 + 48x - 32 = 0$ are 1 and 2; find the other roots.