University of the State of New York

Examination Department

154TH EXAMINATION

ADVANCED ALGEBRA

Tuesday, June 14, 1898—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 *are answered only the first* 10 *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 *variation, combinations, arithmetic progression, infinite series, proportion by composition.*

2 Reduce $\frac{1}{a^{\frac{1}{3}}+b^{\frac{3}{2}}}$ to an equivalent fraction with a rational denominator.

3 Prove that if $a+\sqrt{b}=c+\sqrt{d}$, when a, b, c and d are rational expressions, then $a=c$ and $\sqrt{b}=\sqrt{d}$.

4 Given the inequality $a>b$, both a and b being positive; what is the effect of multiplying both terms by $+x$, by $-x$; of adding c when $c>a$; of subtracting c when $c>a$; of changing the signs of both terms?

5 How many different committees of 5 each can be formed in a club of 15 members?

6 Derive the formula for the sum of the terms in arithmetic progression.

7 Divide $475 among A, B and C in geometric progression so that A's share added to B's shall exceed C's share by $25.

8 Find by the use of the binomial theorem the 5th root of 244 correct to *three* decimal places.

9 Convert $\frac{179}{18}$ into a continued fraction.

10 Separate $\frac{4x+11y}{x^2+5xy+6y^2}$ into its component parts by the method of undetermined coefficients.

11 Derive the formula for the sum of a series by the differential method.

12 In the system whose base is 2, what is the logarithm of $\frac{1}{8}$, of 16, of 2? Derive the formula for the logarithm of the product of two numbers in terms of the logarithms of the numbers.

13 Transform $x^4+4x^3-3x^2+2x-1=0$ into an equation whose roots shall be less by 2 than those of the given equation.

14–15 State Sturm's theorem and by its use find the number and position of the real roots in $x^3-5x^2+7x-3=0$