University of the State of New York

Examination Department

143D EXAMINATION

ADVANCED ALGEBRA

Tuesday, March 23, 1897—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 *interpolation, recurring series, summation of series, identical equation, commensurable root.*

2 Prove that $x^2+m^2 : x^2-m^2 = y^2+n^2 : y^2-n^2$, when $m+n : m-n = x+y : x-y$

3–4 Show when the roots of a quadratic equation will (*a*) be real, (*b*) be irrational, (*c*) be equal, (*d*) have like signs.

5 For two cubic blocks of marble at $5 a cubic foot a sculptor paid $2340; if the length of the two together is 12 feet, what is the length of each block?

6 What is the base of a system of logarithms in which log $0.008 = -1.5$?

7–8 S_1, S_2 and S_3 represent the sum of n, $2n$ and $3n$ terms respectively of an arithmetic series; prove that $S_3 = 3(S_2 - S_1)$

9 Prove that if a is a root of the general equation of the *nth* degree, as usually written, the first member of this equation is exactly divisible by $x-a$.

10–11 Prove that the successive convergents to a continued fraction are alternately less and greater than the true value of the continued fraction.

12 Find the sum of n terms of the series $1^2, 2^2, 3^2, 4^2, 5^2, 6^2$, etc.

13 A dealer buys sheep and sells them at a profit of 20%; with the proceeds he again buys sheep and sells them so as to gain 25%; once more he invests the proceeds in sheep and this time gains 16%. If his last profit amounts to $300, how much money did he invest at first?

14 Form the equation whose roots are -6, $3+\sqrt{5}$, $3-\sqrt{5}$.

15 Find each root of $x^3 = a^3$.