Examination Department

142D EXAMINATION

ADVANCED ALGEBRA

Tuesday, January 26, 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 *logarithm, base of a system of logarithms, continued fraction, periodic continued fraction, convergent.*

2 If $a:b=c:d$, prove that $a(a+b+c+d)=(a+b)(a+c)$

3–4 Show when the roots of a quadratic equation will (*a*) be imaginary, (*b*) be rational, (*c*) be unequal, (*d*) have unlike signs.

5 From a station on a trolley line a closed car leaves every 9 minutes, beginning at 7 a. m., and an open car every 16 minutes, beginning at 7:16 a. m. At what time will an open car leave exactly 3 minutes after a closed car?

6 What is the base of a system of logarithms in which $\log \frac{1}{8}=-1+.25$?

7–8 Find the least number which, divided by 15, leaves a remainder of 14, and divided by 13, leaves a remainder of 12.

9 Prove that every equation of the *nth* degree, containing but one unknown quantity, has *n* roots and no more.

10–11 Derive the law of formation of the successive convergents to a continued fraction.

12 By the differential method, find the sum of *n* terms of the series 1^3, 2^3, 3^3, 4^3, 5^3, 6^3, etc.

13 Separate $\frac{x-2}{x^2-3x-10}$ into partial fractions.

14 Form the equation whose roots are 2, 3, 5 and -6.

15 Find each root of $x^3+2x^2-23x-60=0$