## High School Department

164TH EXAMINATION

# ADVANCED ALGEBRA

**Tuesday, June 12, 1900—9.15 a. m. to 12.15 p. m., only**

*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. Papers entitled to 75 or more credits will be accepted.*

1 Simplify $\dfrac{x-7x^{\frac{1}{2}}}{x-3\sqrt{x}-14} \div \left(1+\dfrac{2}{\sqrt{x}}\right)^{-1}$

2 Find a mean proportional between

$$2x^{3m}+7x^{2m}+4x^{m}-4 \text{ and } 2x^{m}-1$$

3 Reduce $\dfrac{1}{\sqrt[3]{a}-\sqrt[3]{b}}$ to a fraction having a rational denominator.

4 Prove that any factor may be transferred from the numerator of a fraction to the denominator by changing the sign of its exponent.

5 State and prove the theorem of limits.

6 How many different committees, each consisting of 4 men and 3 women, can be selected from a company of 12 men and 9 women?

7 The sum of the first four terms of a geometric series is 130, and the sum of the first two terms is 40; find the 9th term of the series.

8–9 Show under what conditions the two roots of the equation $ax^2+bx=c$ will be *a*) equal, *b*) positive, *c*) negative, *d*) imaginary. Give proofs.

10 Expand $\dfrac{1+x}{2+x+x^2}$ into a series of the ascending powers of $x$ by the method of undetermined coefficients, finding *four* terms.

11 Using continued fractions find *three* approximate values of $\pi$ (3.14159) in common fractions.

12 Write the first *four* terms of the binomial formula. State in words, without doing the work, how this formula may be applied to find the value of $\sqrt[5]{33}$ to any required degree of accuracy.

13 By the method of differences find the sum of eight terms of the series 2, 6, 12, 20, 30, 42, etc.

14 Derive a rule for transforming an equation into another whose roots are those of the given equation with contrary signs.

15 Given log 8 = .9031, log 9 = .9542; find log 15, log 600, log .4.