High School Department

169TH EXAMINATION

ADVANCED ALGEBRA

Tuesday, June 18, 1901—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. 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 Define logarithm, series, surd, partial fraction, determinant.

2 Solve as a quadratic $x^4+6x^3+x^2-24x=20$

3 Divide $4\sqrt[3]{x^2}-8x^{\frac{1}{3}}-5+\frac{10}{\sqrt[3]{x}}+3x^{-\frac{2}{3}}$ by $2x^{1\frac{5}{12}}-\sqrt[12]{x}-\frac{3}{\sqrt[4]{x}}$

4 How many different signals can be displayed by means of four triangular flags of different colors, using one or more than one at a time and arranging vertically?

5 Assuming the geometric series, $a+ar+ar^2+\ldots ar^{n-1}$, deduce a formula for finding the sum of an infinite decreasing geometric series.

6 Find the quotient of $x^5-4x^4-17x^3-13x^2-11x-10$ divided by x^2+3x+2, using the method of synthetic division.

7 Prove that any ordinary fraction in its lowest terms may be converted into a terminating continued fraction.

8 Expand $\frac{2x}{3-2x^2}$ to *five* terms of the ascending powers of x, using the method of undetermined coefficients.

9 Given log 3=.4771, log 5=.6990; find log 2, log 6, log .125, log $\frac{1}{15}$, log 250.

10 Form the equation whose roots are -2, -3 and 1; transform this equation into one whose roots are each 1 less than the roots of the original equation.

11 One of the roots of the equation $x^4-5x^3+5x^2+17x-42=0$ is $2-\sqrt{-3}$; find the other *three* roots of this equation.

12 Determine, by a general method, the equal roots of the equation $x^4-6x^3+9x^2+4x-12=0$

13 A, B and C start together from the same point and travel at the rate of a, b and c miles an hour respectively, around a circular island n miles in circumference, C going in a direction opposite to that taken by A and B; find when A and B will be together and when A and C will be together.

14 Find the factor that will rationalize $a^{\frac{1}{2}}+b^{\frac{1}{3}}$

15 Write in the usual form the general determinant of the second order. Show how this determinant may be applied in the solution of simultaneous equations.