High School Department

182D EXAMINATION

ADVANCED ALGEBRA

Tuesday, June 14, 1904—9.15 a. m. to 12.15 p. m., only

Answer eight questions but **no more.** *If more than eight are answered only the first eight 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* 12½ *credits. Papers entitled to 75 or more credits will be accepted.*

1 Divide $x^2+2x-\frac{16}{x^2}-\frac{32}{x^3}$ by $\sqrt{x}+\frac{4}{\sqrt{x}}+\frac{4}{\sqrt{x^3}}$

2 Find the number of combinations of 72 different things taken 68 at a time.

3 State the theorem of undetermined coefficients and give *three* of its applications.

4 Interpret the forms $\frac{a}{0}$, $\frac{a}{\infty}$, $\frac{0}{0}$, $\frac{\infty}{\infty}$ Explain in each case.

5 Find the three cube roots of unity. Prove that of these three roots (*a*) one imaginary root is the square of the other, (*b*) the sum of the three roots is zero, (*c*) the product of the two imaginary roots is unity.

6 If a, b and c are unequal positive numbers, prove that $a^2+b^2+c^2>ab+ac+bc$.

7 Find the square root of $31-10\sqrt{6}$

8 Solve $x^4+x^3-17x^2-5x+60=0$

9 Find the sum of 4, $-\frac{8}{3}$, $\frac{16}{9}$ . . . to infinity.

10 Of an equation of the fifth degree in the general form three of the roots are a, $-b$ and $-c$; find (*a*) the sum of the other roots if the second term is wanting, (*b*) *one* of the other roots if the last term is wanting, (*c*) *each* of the other roots if both the second and the last term are wanting.

11 By the method of differences find the 13th term of the series $-a+1$, 1, $2a+2$, $5a+5$, $9a+11$ etc.

12 State and illustrate *three* principles relating to determinants.