

High School Department

178TH EXAMINATION

ADVANCED ALGEBRA

Tuesday, June 16, 1903—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 Solve $7x^{-\frac{1}{2}} - 20 = 3\sqrt{x}$
- 2 Find by the binomial theorem the value of $\sqrt[3]{9}$ to four decimal places.
- 3 From 6 Republicans and 8 Democrats 6 speakers consisting of 2 Republicans and 4 Democrats are to be selected; in how many different ways can the names of 6 speakers be arranged on the program?
- 4 If x varies inversely as $y^2 + 1$ and is equal to 18 when y is equal to 7, find the value of x when y is equal to 3.
- 5 Form the equation of the fourth degree with rational coefficients three of whose roots are 1, -3 and $1 + \sqrt{-23}$. State Descartes's rule of signs and show its application to this equation.
- 6 The 2d term of a geometric progression is $\frac{1}{15}$, the 5th term is $\frac{3}{125}$; find the 7th term. Derive the formula used.
- 7 In an equation of the n^{th} degree in the general form, state the relation existing between the roots and the coefficient of (a) the second term, (b) the third term, (c) the fourth term, (d) the last term.
- 8 Revert to four terms $y = x + 2x^2 + 3x^3 + 4x^4 + \dots$. Find the approximate value of x when $y = .2$
- 9 Prove that an equation of the n^{th} degree containing but one unknown quantity, has n roots and no more.
- 10 Transform $x^5 - 5x^4 + 9x^3 - 9x^2 + 5x - 1 = 0$ into an equation whose roots shall be less by 2 than the roots of the given equation.
- 11 Derive the formula for finding by the method of differences the n^{th} term of a series.
- 12 Applying determinants, solve $\begin{cases} 2x + y = 12 \\ 3x - 4y = 7 \end{cases}$

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