Examination Department

143D EXAMINATION

ALGEBRA

Monday, March 22, 1897 — 9:15 a. m. to 12:15 p. m., only

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100 *credits, necessary to pass,* 75

Answer questions 1–5 and five of the others but **no more.** *If more than five of these other questions are answered only the first five 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 *radical, trinomial, power, quadratic equation, involution.*

2 Simplify $\left(1 - \dfrac{\frac{a^2}{b^2} - \frac{b^2}{a^2}}{\frac{a^2}{b^2} + \frac{b^2}{a^2}}\right)\left(\dfrac{a^3}{b} + \dfrac{b^3}{a}\right)$

3 Factor the following: $3bc - 4ad + 6ac - 2bd$, $216a^3 + b^3$, $7x^2 + 25xy - 12y^2$, $(x + y)^4 - 1$, $4a^2b^2 - (a^2 + b^2 - c^2)^2$

4 Solve $\begin{cases} abx + cdy = 2 \\ ax - cy = \dfrac{d-b}{bd} \end{cases}$

5 Simplify $2x - \{2x + (y - z) - 3z + [2x - (y - \overline{z - 2y}) - 3z] + 4y\}$

6 Solve $adx - acx^2 = bcx - bd$

7–8 A certain number is expressed by three digits whose sum is 12; the sum of the first and last digits is equal to the middle digit, and if the hundreds' and tens' digits are interchanged the resulting number will be greater than the original number by 360. Find the number.

9 Find the square root of $16x^4 + \dfrac{16}{3}x^3y + 8x^2 + \dfrac{4}{9}y^2 + \dfrac{4}{3}y + 1$

10 Expand by the binomial theorem $\left(2a^2 - \dfrac{a}{2}\right)^5$ and give all the work for finding the coefficients.

11–12 Solve $\begin{cases} x^2 + xy - 2y^2 = -44 \\ xy + 3y^2 = 80 \end{cases}$

13 Solve $\dfrac{a}{x} + \dfrac{\sqrt{a^2 - x^2}}{x} = \dfrac{1}{3}$

14 A sum of money at simple interest amounted in 10 months to \$2100 and in 18 months to \$2180; find the sum and the rate of interest.

15 Simplify $\sqrt{\dfrac{a^5 b^2}{c^2 x^3}} - \sqrt{\dfrac{a^3 c^2}{d^4 x}} + \sqrt{\dfrac{ad^2 y^4}{p^2 x}}$

$3\sqrt{\dfrac{3a}{4b^2}} + 2\sqrt{\dfrac{a}{b^2}} - \sqrt{\dfrac{a}{b^2}}$