University of the State of New York

Examination Department

135TH EXAMINATION

ALGEBRA

Monday, March 23, 1896 — 9:15 a. m. to 12:15 p. m., only

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100 *credits, necessary to pass,* 75

Answer 10 questions but no more. If more than 10 questions are answered only the first 10 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 *equation, radical, surd, root of an equation, degree of a term.*

2 Simplify $\left(\dfrac{x+y}{x} + \dfrac{x-y}{y}\right)\left(\dfrac{x-y}{x} - \dfrac{x+y}{y}\right)\dfrac{x^2 y^2}{x^3 + y^3}$

3 Simplify $2\{a - 3b[a - b - (2+a) + 2(a-b)]\}$

4 Factor the following: $4x^2 - 1$, $x^2 - x + \frac{1}{4}$, $2a^2 - 5ab + 2b^2$, $7x^2 - 20xy - 3y^2$, $x^3 + y^3$

5 Solve the following equation, writing an axiom as authority for each step: $2x + \dfrac{x}{3} - 4 = \dfrac{x}{2} + 1\frac{1}{2}$

6 Solve $x + 2y + z = 13$, $2x - y - z = -4$, $x - y + 2z = 9$

7 Solve $ax^2 + bx = c$

8 Solve $x + y = 5$, $x^2 + y^2 = 13$

9-10 If the sum of two numbers is multiplied by the smaller number the product is 40; if the difference of the same numbers is multiplied by the greater the product is 12; find the numbers.

11-12 Prove that half the sum of any two numbers plus half the difference is equal to the greater, and half the sum minus half the difference is equal to the less.

13 Expand $(3a - 2b)^5$ by the binomial theorem, writing all the computations for finding the coefficients.

14 Simplify $\sqrt{18}$, $\sqrt[3]{128}$, $\sqrt{\dfrac{a^3}{b}}$, $\sqrt{\dfrac{a}{b}} \times \sqrt{\dfrac{2a}{3b}}$, $\sqrt{\frac{1}{3}} + \frac{1}{3}\sqrt{3}$

15 Solve $\sqrt{x+10} + \sqrt{x-2} = \sqrt{6x}$