University of the State of New York

Examination Department

139TH EXAMINATION

ALGEBRA

August 1896 — Three hours, only

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 *coefficient, degree of a term, surd, symmetric equation, quadratic equation.*

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

3 Simplify $\sqrt{a} \times \sqrt[3]{b}$; $3\sqrt[3]{\dfrac{4}{9}}$; $\sqrt{\sqrt[3]{a^2}}$; $\dfrac{1}{a+b}\sqrt{a^2+2a^2b+ab^2}$;

$$\dfrac{\sqrt{27}+\sqrt{75}}{\sqrt{12}}$$

4 Solve, giving 4 roots, $x^4 - 13x^2 + 36 = 0$

5 Solve $x^2 + y^2 = 17$
$x + y = 5$

6 Solve $\dfrac{x+3}{2} + \dfrac{x-3}{3} - x = \dfrac{4x-2}{6} + \dfrac{x}{3} - 5$, giving axiom for each step of the solution.

7 Multiply $32a^{-\frac{5}{2}} - 16a^{-2}b^{-\frac{1}{3}} + 8a^{-\frac{3}{2}}b^{-\frac{2}{3}} - 4a^{-1}b^{-1} + 2a^{-\frac{1}{2}}b^{-\frac{4}{3}}$

$- b^{-\frac{5}{3}}$ by $2a^{-\frac{1}{2}} + b^{-\frac{1}{3}}$

8 Extract square root of $4a^2 + 9b^2 + 16c^2 - 12ab + 16ac - 24bc$.

9 Expand by binomial theorem $\left(a^2 - 2b^{\frac{1}{2}}\right)^4$. Give all the work for finding the coefficients.

10–11 Solve $\dfrac{2}{x} + \dfrac{3}{y} = 13$; $\dfrac{4}{x} + \dfrac{1}{z} = 12$; $\dfrac{1}{y} + \dfrac{2}{z} = 11$

12–13 In a number of two digits the first digit is twice the second, and if 18 be subtracted from the number the order of the digits will be inverted; find the number.

14–15 If the sum of two numbers be multiplied by the greater the product is 40; if their sum be multiplied by the less the product is 24; find the numbers.