University of the State of New York

77TH EXAMINATION

ADVANCED ALGEBRA

MONDAY, June 8, 1891—9:15 A. M. to 12:15 P. M., only

40 *credits*, *necessary to pass*, 30

NOTE.—Give each step of solution, indicating the operations by appropriate signs. Use cancellation when possible. Reduce fractions to lowest terms. Express final result in its simplest form and mark it *Ans.*

1. Define (*a*) a binomial surd; (*b*) homogeneous quadratic equations; (*c*) an incommensurable root. Give an example of each. 3

2. Prove $a^n \times b^n = (ab)^n$. 3

3. Find the cube root of $8a^3 - 12a^{\frac{11}{6}}b^{-1} + 6a^{\frac{5}{3}}b^{-2} - a^{\frac{3}{2}}b^{-3}$. 3

4. Solve $x + y = 25$ and $x^{\frac{1}{2}} + y^{\frac{1}{2}} = x - y$. 4

5. Prove that $\log \frac{1}{n} = -\log n = \operatorname{colog} n - 10$. (The colog equals the arithmetic complement of a logarithm.) 3

6. Given $\log 2 = 0.30103$, $\log 3 = 0.47712$; find $\log \frac{2^{\frac{2}{3}}}{3^{\frac{5}{6}}}$. 2

7. If a men working b hours a day do a certain piece of work in c days, in how many days could m men have done it, working n hours a day? 2

8. How many permutations may be made of the letters of the word Monday, taken all at a time? 2

9. The sides of a triangle represent three terms of an arithmetic series. The hypotenuse is 55 inches long; find the length of the other two sides. 3

10. Find the arithmetic and the geometric mean between $x - y$ and $x + y$. 2

11. Develop $(1-x)^{\frac{1}{2}}$ into a series of four terms: (*a*) by the method of indeterminate coefficients; (*b*) by the binomial theorem. 6

12. Find the sum of the first 12 terms of the series 1, 4, 10, 20, 35. 3

13. All the roots of the equation $x^5 - 3x^4 - 5x^3 + 15x^2 + 4x - 12 = 0$, are real. State (*a*) the number of its roots; (*b*) the number of its positive roots; (*c*) the principles according to which each result is determined. 4