University of the State of New York

75TH EXAMINATION

ADVANCED ALGEBRA

MONDAY, Jan. 19, 1891—9.15 A. M. to 12:15 P. M., only

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48 credits, necessary to pass, 36

1. Define and illustrate: (*a*) system of logarithms; (*b*) permutations; (*c*) series. 3

2. Assuming $\frac{a^m}{a^n}=a^{m-n}$ prove that (*a*) $a^0=1$; (*b*) $a^{-n}=\frac{1}{a^n}$. Prove that $-$ multiplied by $-=+$. 3

3. Find the product of $4+\sqrt{-7}$ and $8-2\sqrt{-7}$, and reduce the result. 3

4. Prove that (*a*) $\log mn=\log m+\log n$; (*b*) $\log \text{base}=1$. 4

5. Given $\log 2=0.30103$, $\log 3=0.47712$; find $\log \sqrt[225]{8}$ 4

6. Simplify (*a*) $(-a)^{2n+1}\times(-a)^{2n-1}$ n being an integer; (*b*) $(a^{-6}-b^{-4})\div(a^{-3}-b^{-2})$. 3

7. Form the equation whose roots are $a+\sqrt{-5b}$ and $a-\sqrt{-5b}$. 2

8. A debt can be discharged in a year by paying \$1 the first week, \$3 the second, \$5 the third, and so on; find the last payment and the amount of the debt. 2

9. The 7th term of an arithmetical series is 27, its 13th 51; find the first term and the common difference. 3

10. How many different combinations may be formed of 8 letters, taken 4 at a time? 3

11. Find, by the binomial theorem, the 7th term of $(1-x)^{\frac{1}{3}}$. 4

12. Expand to 4 terms, by the method of indeterminate co-efficients, $\frac{2+x}{1+x+x^2}$. 4

13. Resolve into partial fractions $\frac{3x-5}{x^2-13x+40}$ 4

14. Write the 7th term of the series, 3, 5, 8, 12, 17, and show how it is found. 3

15. One root of the equation $x^3+x^2-16x+20=0$ is -5; find the other roots. 3