

## University of the State of New York

38TH ACADEMIC EXAMINATION

## ADVANCED ALGEBRA

MONDAY, June 9, 1890—Time, 9:15 A. M. to 12:30 P. M., only

44 credits, necessary to pass, 33

1. Find the sum of  $\sqrt{\frac{a^2(a-b)}{a+b}}$ ,  $\sqrt{\frac{b^2(a+b)}{a-b}}$  and  
 $(a^2 - 3b^2) \sqrt{\frac{1}{a^2 - b^2}}$  ..... 3
2. Simplify  $\left(\frac{x^{p+q}}{x^q}\right)^p \div \left(\frac{x^q}{x^{q-p}}\right)^{p-q}$  ..... 2
3. Solve  $\frac{\sqrt{4x+2}}{4+\sqrt{x}} = \frac{4-\sqrt{x}}{\sqrt{x}}$  and use the roots thus found to  
 form a quadratic equation. .... 3
4. Solve  $(x+y)^2 - 4(x+y) = 45$   
 $(x-y)^2 - 2(x-y) = 3$  ..... 4
5. A railway passenger observes that a train passes him moving  
 in the opposite direction in 2 seconds; whereas if it had been mov-  
 ing in the same direction with him it would have passed him in 30  
 seconds. Compare the rates of the two trains ..... 4
6. Find the arithmetical mean between  $a^2 + ab - b^2$  and  $a^2 -$   
 $ab + b^2$  ..... 2
7. Three numbers whose sum is 18 are in arithmetical progression;  
 if 1, 2, and 7 be added to them respectively they are in geometrical  
 progression. Required the numbers ..... 4
8. At a certain house there were 8 regular boarders; and one of  
 them agreed with the landlord to pay \$35 for his board so long as he  
 could select from the company different parties, equal in number, to  
 sit each for one day on a certain side of the table. At what price  
 a day did he secure his board? ..... 4
9. Expand  $\frac{1}{\sqrt[3]{1+x}}$  to five terms by the binomial theorem.. 4
10. What system of logarithms is used in practical calculations?  
 What two logarithms are constant in value whatever the  
 system? ..... 2
11. Separate into partial fractions  $\frac{2x^2 - 7x + 1}{x^3 + 1}$  ..... 4
12. Expand to five terms by the method of indeterminate coeff-  
 cients  $\frac{2 - 3x + 4x^2}{1 + 2x - 5x^2}$  ..... 4
13. Solve  $x^4 + x^3 - 14x^2 - 2x + 24 = 0$  ..... 4