

University of the State of New York

## Examination Department

117th examination

### ALGEBRA

Wednesday, November 29, 1893—9:15 a. m. to 12:15 p. m., only

100 credits, necessary to pass, 75

Answer any 10 questions but no more. If more than 10 questions are answered, only the first 10 of these answers will be considered. Each complete answer will receive 10 credits. Give each step of solution. Reduce fractions to lowest terms. Express final result in its simplest form and mark it Ans.

1 Define *pure equation*, *affected quadratic*, *surd*, *elimination*, *binomial*.

2 Simplify  $2a - [4b - \{2a - (a + 3b) + 2b\} - c]$ .

3 Reduce the following to its simplest form:

$$\left(\frac{a}{b} - \frac{b}{a}\right) \div \left(\frac{b}{a} - \frac{a}{b}\right) + \frac{a^2b^2 - b^4}{a + b} \times \frac{1}{b^2(a - b)}.$$

4 Factor  $a^4 - b^4$ ;  $4a^2 - 12ab + 9b^2$ ;  $a^2 + ab - 12b^2$ ;  $x^4 + x^2y^2 + y^4$ ;  $9a^6 - 16b^8$ .

5 Solve the following: 
$$\begin{cases} \frac{3x}{4} + \frac{4y}{3} = \frac{3a}{2} + 4b \\ \frac{2x}{3} + y = \frac{4a}{3} + 3b. \end{cases}$$

6 Solve  $\frac{x^2}{2} + 3ax = \frac{a^2 + b^2}{2} + 3a^2 + 5ab$ .

7 Solve the following, finding two values for each unknown quantity: 
$$\begin{cases} x^2 + xy + y^2 = 28 \\ x - y = 2. \end{cases}$$

8 Raise  $4a^2 + 3b$  to the sixth power, indicating all the operations for finding the coefficients.

9 The square root of  $a$  is to be raised to the third power and the fifth root of the result taken. Indicate ( $a$ ) by the use of radical signs; ( $b$ ) by the use of fractional exponents.

10 Perform the operation indicated in the following:

$$\left(a^{\frac{1}{3}} - a^{\frac{1}{6}}b^{\frac{1}{6}} + b^{\frac{1}{3}}\right) \left(a^{\frac{2}{3}} - a^{\frac{1}{3}}b^{\frac{1}{3}} + b^{\frac{2}{3}}\right).$$

11 Find the greatest common divisor of  $42x^3 - 8x^2 - 30x - 4$  and  $21x^3 - 32x^2 - 54x - 7$ .

12 Divide  $4x^5 - 9x^4y + 9x^3y^2 + 10x^2y^3 + 12xy^4 + 7y^5$  by  $4x^2 - 3xy + 2y^2$ .

13 Simplify the following:  $3\sqrt{18x^3}$ ,  $\sqrt[3]{56x^4y}$ ,  $\sqrt{8} \times \sqrt{12}$ ,  $\sqrt{20a^3} + \sqrt{45a^5}$ ,  $\sqrt{24} \div \sqrt{32}$ .

14 A number expressed by two digits is equal to six times the sum of its digits plus 2; if the order of the digits is reversed the resulting number will be 9 less than the original. Find the number.

15 If the numerator of a certain fraction is increased by 6 the value of the fraction will be 1; if the denominator is increased by 6 the value will be  $\frac{1}{2}$ . Find the fraction.