The University of the State of New York

EXAMINATION FOR QUALIFYING CERTIFICATES

ELEMENTARY ALGEBRA

Monday, September 11, 1922—9.15 a. m. to 12.15 p. m., only

Answer question 1 and five of the others. Full credit will not be granted unless all operations (except mental ones) necessary to find results are given; simply indicating the operations is not sufficient. Each answer should be reduced to its simplest form. Papers entitled to less than 75 credits will not be accepted.

1 *a* Multiply $3x^2 - 7x + 2$ by $4x + 3$ and check the result, letting $x = 3$

b From the sum of $3a^2 + 2ab - c^2$ and $5ab - 4 + 3c^2$ subtract $5c^2 + 3a^2 - 6$

c Express $\frac{a+3b}{4}$ as a fraction having a denominator of $4a^2 - 8b$

d Without multiplying the expressions, show whether $(9x^2 - 25)(2x^2 - 8x - 24)$ equals $(6x^2 + 2x - 20)(3x^2 - 13x - 30)$

e Solve the following equation and check *one* result:

$$x - 1 = \frac{8 - x^2}{2x}$$

f Simplify

$$3a - [a - (2a - 3b) + 3a] - 2(5b - 4)$$

g Without solving, show whether $2 + \sqrt{6}$ is a root of the equation $x^2 - 4x - 3 = 0$

2 Solve the following set of equations for x and y:

$$bx + ay = 2ab$$
$$ax + by = a^2 + b^2$$

3 The sum of two numbers is 41; if the greater is divided by 1 more than the smaller, the quotient is 3 with a remainder of 2. Find the numbers.

4 *a* Solve the formula $V = \frac{1}{6}h(b + c + 4m)$ for c in terms of the other letters.

b Find the value of c correct to hundredths if $V = 33.075$, $h = 7.5$, $b = 6.4$ and $m = 4.7$

5 Extract the square root of

$$9x^4 - 3x^3 + 4 + \frac{49x^2}{4} - 2x$$

6 A clerk earns $440 in a certain number of months; her salary is then increased 20% so that she earns $396 in one month less time than was needed to earn the $440 at her old salary. Find her new salary.

7 *a* A retailer buys d dozen pencils at 29 cents a dozen and sells them at the rate of c cents apiece; how much does he gain on the transaction?

b During the baseball season A made r home runs which equalled 3 more than twice B's score; how many home runs did B make?

8 Solve the following set of equations and group the results:

$$3y = 2x - 3$$
$$7xy = 4x^2 - 15$$

9 The following table shows the total monthly sales (in round numbers) of a jewelry store for the same periods in 1919 and 1921:

	July	*Aug.*	*Sept.*	*Oct.*	*Nov.*	*Dec.*
1919.....	$3300	$3300	$3500	$3800	$4200	$5000
1921.....	1800	1600	1800	2000	2300	2600

a Represent this table graphically, using a solid line for the 1919 sales and a broken line for the 1921 sales.

b What conditions in the business world might account for the differences in the two graphs?