The University of the State of New York

EXAMINATION FOR QUALIFYING CERTIFICATES

ELEMENTARY ALGEBRA

Monday, September 10, 1917—9.15 a. m. to 12.15 p. m., only

Answer eight questions. 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 Factor *each* of the following:

$14a^2-109ab-24b^2$

$4x^2+1-y^2-2yz-z^2+4x$

$(a^2+1)^3-(b^2+1)^3$

$110-x-x^2$

x^3-6x^2+6x-5

2 Solve $\frac{a-b}{x-c}+\frac{b-c}{x-a}+\frac{c-a}{x}=0$

3 Simplify

$$\tfrac{1}{2}\sqrt[3]{24}-\tfrac{1}{7}\sqrt{147}+\tfrac{3}{11}\sqrt{363}-\tfrac{2}{3}\sqrt[3]{648}-\sqrt{507}+10\sqrt[3]{3}$$

4 Solve and check $x^2=21+\sqrt{x^2-9}$

5 The difference between two sides of a rectangular wheat field is 30 rods; a farmer cuts a strip 5 rods wide around the field and finds that the area of the strip is $7\frac{1}{2}$ acres. What are the dimensions of the field?

6 *a* If a man has a dollars and b quarters and pays a debt of x dollars and 50 cents, how many cents has he left?

b Write *three* consecutive numbers the least being x. Write *three* consecutive numbers the greatest being y.

7 Solve $\begin{cases} xy=6 \\ x^2+xy+y^2=19 \end{cases}$

8 What number must be subtracted from *each* of the numbers 7, 8, 9 and 12 so that the resulting differences taken in order shall form a proportion?

9 Two trains traveling toward each other left at the same time two stations 240 miles apart; each reached the station from which the other started, the one $3\frac{3}{8}$ hours and the other $1\frac{1}{3}$ hours after they met. Find their rates of running.

10 Solve

$$\frac{3}{x}-\frac{1}{y}=\frac{7}{2}$$

$$\frac{5}{y}+\frac{3}{z}=-7$$

$$\frac{2}{x}-\frac{1}{z}=0$$

11 Extract the square root of

$$28x^2-47x^4+49x^6-42x^5-4x^8+16x+4$$

[Show all the work.]