University of the State of New York

EXAMINATION FOR QUALIFYING CERTIFICATES

ADVANCED ALGEBRA

Monday, September 14, 1914—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. Each complete answer will receive 12½ credits. Papers entitled to less than 75 credits will not be accepted.

1 Solve $2x^2 - 4x + 3\sqrt{x^2 - 2x + 6} = 15$

2 If the roots of the equation $ax^2 + bx + c = 0$ are m and n, find the equation whose roots are $\frac{1}{n}$ and $\frac{1}{m}$.

3 A traveler walks a certain distance; if he had gone $\frac{1}{2}$ mile an hour faster he would have walked the distance in $\frac{4}{5}$ of the time, but if he had gone $\frac{1}{2}$ mile an hour slower he would have been $2\frac{1}{2}$ hours longer on the road. Find the distance.

4 Represent graphically the sum of the roots of the equation $x^2 - 4x + 9 = 0$

5 *a* Find the number of permutations of all the letters in the word *success*.

b How many words, each containing 3 consonants and 2 vowels, can be formed from 6 consonants and 4 vowels?

6 Find the geometrical progression whose sum to infinity is $4\frac{1}{2}$ and whose second term is -2.

7 Find the value of $\begin{vmatrix} 3 & 1 & 0 & 4 \\ 2 & 3 & -1 & 5 \\ 6 & 1 & 3 & 2 \\ 4 & 0 & 6 & 1 \end{vmatrix}$

8 Solve the equation $2x^5 - 7x^4 + 6x^3 - 11x^2 + 4x + 6 = 0$

9 Find, to *two* places of decimals, the real root of the equation $x^4 + x^3 - 4x^2 - 16 = 0$

10 Transform $x^3 - x^2 - x + 4 = 0$ into an equation whose roots shall be respectively the roots of the given equation increased by 3.