The University of the State of New York

EXAMINATION FOR QUALIFYING CERTIFICATES

ADVANCED ALGEBRA

Monday, September 11, 1916—9.15 a. m. to 12.15 p. m., only

Answer eight questions. Each answer should be reduced to its simplest form. Papers entitled to less than 75 credits will not be accepted.

1 Transform $x^3-4x^2-3x-29=0$ into an equation whose roots shall be respectively those of the first equation increased by 6.

2 Find the equation of lowest degree with rational coefficients, *two* of whose roots are $(-5+2i)$ and $(-1+\sqrt{5})$.

3 Solve for all values of x and y:

$$\begin{cases} xy-(x-y)=-9 \\ xy(x-y)=-20 \end{cases}$$

4 Find *three* roots of $x^3-8=0$ and represent these roots graphically.

5 *a* From 10 men and 8 women, how many committees can be chosen, each consisting of 4 men and 3 women?

b In how many ways can 5 single volumes and a set of 3 volumes be arranged on a shelf, if the set is kept together and in order?

6 Find by Horner's method to *two* decimal places the positive root of $2x^3+x^2-15x-59=0$

7 Find the sixth term of $\left(a^{-2}-\frac{a^2x}{2b}\right)^8$

8 Plot the graph of $x^3-2x^2-2x+3=0$ and estimate from the graph the roots of this equation.

9 In a race one boat covers the course at the uniform rate of 4 yards a second; another covers the first half of the course at the rate of $3\frac{1}{2}$ yards a second, and the second half at $4\frac{1}{2}$ yards a second, and reaches the goal 15 seconds after the first boat. Find the time taken by each boat.

10 There are four numbers such that the sum of the first and last is 11, and the sum of the other two is 10. The first three of these four numbers are in arithmetic progression and the last three are in geometric progression. Find the numbers.