The University of the State of New York

EXAMINATION FOR QUALIFYING CERTIFICATES

INTERMEDIATE ALGEBRA

Tuesday, September 9, 1919—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 *a* Simplify $8^{-\frac{2}{3}}-27^{\frac{1}{3}}+2.5^{0}-\frac{1}{2^{-3}}$

b Solve for m the formula $F=4\sqrt{m}-3m$

2 *a* What must be the value of k in the equation $x^2-(k+5)x+2+k^2=0$ in order that one root may be twice the other?

b Without solving or substituting, determine whether $-3+\sqrt{3}$ and $-3-\sqrt{3}$ are the roots of the equation $x^2+6x=5$. Give all the work that leads to your answer.

3 Factor *each* of the following:

$2x^3+4x^2-11x-15$

$36x^4+44x^2+81$

$6x^2-13x-15$

$6a+25c^2-9-a^2$

4 Solve $\begin{cases} 2x^2-3y^2=29 \\ 5x-2y^2=18 \end{cases}$

5 Plot the graph of $x^2+4x-1=y$ between the values of $x=-5$ and $x=2$. If $x^2+4x-1=0$, find from the graph the roots of the equation correct to the nearest tenth.

6 Three numbers are in arithmetical progression; their sum is 15 and the sum of their squares is 83. Find the numbers.

7 *a* By writing the discriminant only of *each* of the following equations, determine the nature of the roots:

$3x^2+12=12x$

$4x^2+9x+5=0$

$6+x^2=4x$

$x^2+13x=14$

b Find the equation whose roots are

$$\frac{-2+\sqrt{-3}}{2} \text{ and } \frac{-2-\sqrt{-3}}{2}$$

8 The diagonal of a rectangle is 13 inches; if each dimension were decreased by 1 inch, the area would be decreased by 16 square inches. Find the dimensions.

9 Extract the square root of $a^4+3+\frac{1}{a^4}-2a^2-\frac{2}{a^2}$

10 A man invests his savings of $2200 in Liberty Bonds of the 1st and 2d issue; later he exchanges his 3½% bonds for those of the 2d issue paying 4% and thereby increases his yearly income by $4.75. How much does he invest at each rate?