The University of the State of New York

230TH HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Monday, January 21, 1924—9.15 a. m. to 12.15 p. m., only

Write at top of first page of answer paper (a) name of school where you have studied, (b) number of weeks and recitations a week in (1) elementary algebra, (2) intermediate algebra.

The minimum time requirement is five recitations a week for half a school year, or the equivalent, after the completion of elementary algebra.

Answer eight questions, including either question 9 or question 10 or both question 9 and question 10. 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.

In the examination in intermediate algebra the use of the slide rule will be allowed for checking, provided all computations with tables are shown on the answer paper.

1 Find the prime factors of *each* of the following:

$64a^3 + c^3$ [2½]

$m^2 + 16n^2 - 16 + 8mn$ [2½]

$y^4 - 9y^3 + 21y^2 + y - 30$ [2½]

$.14x^{2a} - .11x^ay^n - .15y^{2n}$ [2½]

$2(m-n)^2 - 4(m-n) + 2$ [2½]

2 A man desiring to pay off a debt of \$5040 in monthly payments finds that he can pay \$25 the first month and increase this payment by \$2 each succeeding month; how long will it take him to pay off the debt, if the interest is not included?   [12½]

3 *a* Find the value of $8^{-\frac{1}{3}} \times 16^{\frac{3}{4}} \times 2^0 \times (\sqrt{3})^4$ [4]

b Rationalize the denominator of the following expression and find to the *nearest* tenth the value of the resulting

fraction: $\dfrac{2}{3 - \sqrt{5}}$ [8½]

4 Find the roots of the following equation to the *nearest* hundredth: $3m^2 + .5m - .07 = 0$ [12½]

5 *a* Form the quadratic equation whose roots are $-.3$ and $-.04$.   [3½]

b For what values of k will the roots of the equation

$y^2 - \dfrac{ky}{2} + 6\frac{1}{4} = 0$ be equal?   [4]

c In the equation $x^2 = 5x - r$, find the value of r if the difference between the roots is 11.   [5]

INTERMEDIATE ALGEBRA—*concluded*

6 Solve the following equation and check *one* root:

$$\sqrt{x-1} + \sqrt{2x-1} = \sqrt{4x+5} \quad [10\frac{1}{2}, 2]$$

7 Answer either *a* or *b*:   [12½]

a By the use of logarithms find the value of

$$\frac{0.73 \times 31.6}{3\sqrt{241 \times 3.764}}$$

b The amount (A) of \$P at r % for n years, when interest is compounded annually, is expressed by the formula $A = P(1 + r)^n$. By the use of logarithms find the amount of \$1600 at 6% for 12 years, interest compounded annually.

8 Solve the following set of equations and correctly group your answers:

$$2x^2 + 3xy + y^2 = 20$$
$$5x^2 + 4y^2 = 41 \quad [10, 2\frac{1}{2}]$$

9 Two automobiles travel 40 miles each at uniform rates; one travels 4 miles per hour faster than the other and makes the trip in 20 minutes less time than the other. Find the rates of the two automobiles.   [12½]

10 A dairyman wishes to combine milk and cream to make 40 gallons of a mixture which shall contain 50% butter fat; if the milk contains 5% butter fat and the cream contains 75% butter fat, how many gallons of each must be used?   [12½]

11 Plot the graph of *each* of the following equations and from the graphs determine the common solutions:

$$x^2 + y^2 = 65$$
$$x + 3y + 5 = 0 \quad [6, 4\frac{1}{2}, 2]$$