The University of the State of New York

EXAMINATION FOR QUALIFYING CERTIFICATES

INTERMEDIATE ALGEBRA

Tuesday, September 15, 1925 — 9.15 a. m. to 12.15 p. m., only

Answer eight questions. 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. Papers entitled to less than 75 credits will not be accepted.

1 Factor *each* of the following:

$10x^3 - 19x^2 - 15x$ [2½]

$4x^3 + 4x^2 - 11x - 6$ [2½]

$4c^2 - 4bc - b^2 - 4c^2$ [2½]

$4x^4 - 27 + 3x^2$ [2½]

$m^2 - .4m - .96$ [2½]

2 A man contracts to buy an automobile for $604. He makes an initial payment of $100 and agrees to pay the balance in monthly instalments. If his first monthly payment is $10 and each succeeding payment is $4 more than the preceding one, how many monthly payments will he have to make before he pays for the automobile? [12½]

3 *a* Find the value of $64^{-\frac{1}{3}} + 3(13)^0 + \frac{2+2^{-1}}{5}$ [7]

b Express $\frac{2\sqrt{a} - \sqrt{3b}}{2\sqrt{a} + \sqrt{3b}}$ as a fraction with a rational denominator. [5½]

4 In *each* of the following equations fill in the parenthesis:

a $3x^2 - 4x + (\quad) = 0$, if the roots are equal. [4½]

b $x^2 - (\quad)x + 1 = 0$, if one root is $2 + \sqrt{3}$. [4]

c $4x^2 + 5x + (\quad) = 0$, if one root is 0. [4]

5 A motor boat and a train, starting at the same time, race from *A* to *B*, two cities 140 miles apart. The train completes the trip in 3 hours. The boat travels 100 miles at a uniform speed and then is delayed 15 minutes by engine trouble. For the remainder of the distance the boat increases its former speed 10 miles an hour and reaches *B* 5 minutes ahead of the train. Find the rates at which the boat traveled. [12½]

6 Solve for x and check the result:

$$3\sqrt{x} - \sqrt{9x - 32} = \frac{8}{\sqrt{9x - 32}}$$ [12½]

7 Given the progression $\frac{1}{2}, \frac{3}{4}, \frac{9}{8}$ . . . ; find by using a formula the number of terms necessary to make the sum $\frac{211}{32}$. [12½]

8 If $a = .0647$, $b = 2.576$, $c = 101.35$ and $d = .4007$, find by logarithms the value of y from the formula

$$\tfrac{1}{2}y = \sqrt{\frac{a \times b}{c \times d}}$$ [12½]

9 Solve the following set of equations, group the results and check one pair of answers:

$$7x - 4y = 2$$
$$2x^2 - 3x + 2y = 8$$ [12½]

10 A merchant invested $399 in flour. When the price of flour had risen $1 a barrel, he obtained 4 barrels less for the same sum. How many barrels did he buy the first time? [12½]

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

$$x^2 + 4y^2 = 36$$
$$2y - x = 6$$ [12½]