The University of the State of New York

INTERMEDIATE ALGEBRA

Tuesday, September 12, 1922—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 Find the prime factors of *each* of the following:

$$x^6 - 64y^{12}$$
$$12x^2 + 10\,xy - 12y^2$$
$$y^{5a} - 2y^{4a} - 48y^{3a}$$
$$a^3 + 4a^2 - 11a - 30$$
$$81 + 4(r - s)^2 + 36r - 36s$$

2 Find to the *nearest* hundredth the roots of the equation

$$v^2 - 27.3 = 5.3v$$

3 *a* Rationalize the denominator in $\dfrac{\sqrt{x^2 - 2} - \sqrt{x^2 + 2}}{\sqrt{x^2 - 2} + \sqrt{x^2 + 2}}$

b Divide $r^{\frac{1}{2}} - 2 + r^{-\frac{1}{2}}$ by $r^{\frac{1}{2}} - r^{-\frac{1}{2}}$ and check, letting $r = 8$.

4 If a certain number of two digits is divided by the sum of the digits the quotient is 8; if 3 times the unit's digit is taken from the ten's digit, the result is 1. Find the number.

5 Two persons, A and B, started from the same place at the same time and traveled toward a place 90 miles distant; A traveled 1 mile per hour faster than B and reached the place 1 hour before him. At what rate did each travel?

6 *a* If log $73.4 = 1.8657$, write the logarithm of 7340, 7.34, .0734, $\sqrt[3]{.734}$, $\dfrac{1}{.0734}$

b Find by use of logarithms the value of $\dfrac{(.547)^3}{\sqrt[5]{142.7}}$

7 What are the first and last terms of the series
$\ldots$ 8, 10, 12, $\ldots$, if $S = 300$ and $n = 20$?

8 Solve for *x* and *y*:

$$x^{-2} + y^{-2} = \tfrac{1}{4}$$
$$x^{-1} - y^{-1} = \tfrac{1}{2}$$

9 Form, in *two* different ways, the equation whose roots are $\sqrt{5} - 3$ and $\sqrt{5} + 3$. [Show all work on the paper.]

10 Solve and check:

$$\frac{6\sqrt{y} - 8}{\sqrt{2y} - 8} = \sqrt{2}$$

11 In the formula $h = r - \sqrt{r^2 - (\tfrac{1}{2}w)^2}$

a Solve for *w* in terms of *r* and *h*

b Find *w* to the *nearest* tenth when $h = 6.7$, $r = 8.2$

12 Represent graphically each equation in the following set and from the graphs determine the solutions to this set of equations:

$$x^2 + y^2 = 40$$
$$x - 2y + 10 = 0$$