

## INTERMEDIATE ALGEBRA

Tuesday, September 18, 1923—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:

$$6x^2 + x - 12 \quad [2\frac{1}{2}]$$

$$y^{14} - 128z^7 \quad [2\frac{1}{2}]$$

$$x^2 - .17x - .006 \quad [2\frac{1}{2}]$$

$$x^{6a} - y^{9b} \quad [2\frac{1}{2}]$$

$$x^3 - 4x^2 + x + 6 \quad [2\frac{1}{2}]$$

2 By what expression must  $\frac{1}{x^2} - 2$  be multiplied to obtain  $2x - 3x^{-1} + 3x^{-2} + x^{-3} - 6$ ? Express your answer with positive exponents in ascending powers of  $x$ . [8, 2, 2 $\frac{1}{2}$ ]

3 a Simplify  $\left(\frac{a^{-2}}{b^{-4}c}\right)^{-1} \div \left(\frac{\sqrt{a^{-1}} \times \sqrt[3]{b^3}}{a^2c^{-1}}\right)^{-2}$  [6]

b Find to the nearest hundredth the value of  $\frac{87}{7-2\sqrt{5}}$  first rationalizing the denominator. [6 $\frac{1}{2}$ ]

4 Find to the nearest tenth the negative root of the equation  $\frac{1}{2}x^2 + .8x - .24 = 0$ . What is the error that would result from using this value as a root? [12 $\frac{1}{2}$ ]

5 Solve the following set of equations and group your answers:

$$3x^2 + xy + y^2 = 15$$

$$31xy - 3x^2 - 5y^2 = 45 \quad [10, 2\frac{1}{2}]$$

6 Solve the following equation and check your answer:

$$\sqrt{x} - \sqrt{x-8} = \frac{2}{\sqrt{x-8}} \quad [12\frac{1}{2}]$$

7 By the use of logarithms find the value of

$$\frac{.36 \times \sqrt[3]{89.7}}{60.77} \quad [12\frac{1}{2}]$$

8 a Form the quadratic equation whose roots are  $\frac{4}{3}$  and  $-3$ . [6]

b Without solving the equation, determine the nature of the roots of  $8x^2 - 12x = 9$  [6 $\frac{1}{2}$ ]

9 A dealer bought a horse, expecting to sell it at a profit of 10%; he was forced to sell it for \$50 less than he expected and found in so doing that he had lost 15% on the cost. What did he pay for the horse? [12 $\frac{1}{2}$ ]

10 If the rate of a train is increased 5 miles per hour, the train travels 210 miles in one hour less than the usual time required for the trip; find the usual time. [12 $\frac{1}{2}$ ]

11 a Represent graphically the equation  $x^2 + 2x - 6 = y$  from  $x = -5$  to  $x = +3$  [8]

b From the graph determine to the nearest tenth the roots of the equation  $x^2 + 2x - 6 = 0$  [2 $\frac{1}{2}$ ]

c From the graph determine the nature of the roots of the equation  $x^2 + 2x - 6 = -7$  [2]