The University of the State of New York

EXAMINATION FOR QUALIFYING CERTIFICATES

INTERMEDIATE ALGEBRA

Tuesday, September 14, 1926 — 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 *a* Factor $a^{2n} - 14a^n b^3 + 49b^6$ [3]

b Factor $2ab - 6c - 3b + 4ac$ [3]

c Factor $6x^3 + 5x^2 - 17x - 6$ [3]

d A man sells a house for m^3 dollars in cash. From the proceeds he pays a debt of n^3 dollars and invests the remainder in bonds. If each bond costs $m - n$ dollars, how many bonds does he buy, if no allowance is made for brokerage? [3½]

2 Solve the following equation and check *one* of the values obtained:

$$3\sqrt{x} - \sqrt{3x+1} = \frac{35}{\sqrt{3x+1}} \qquad [10, 2\tfrac{1}{2}]$$

3 By the use of logarithms find the value of the following expression:

$$\frac{7.826 \times \sqrt[5]{764}}{(0.843)^4 \times .03783} \qquad [12\tfrac{1}{2}]$$

4 It is estimated that the value of an automobile depreciates each year 40% of its value the preceding year. A car was purchased for $2500 and was sold 4 years later. Find by formula the value of the car at the time it was sold. [12½]

5 Divide $2x^{\frac{1}{2}} + x^{-\frac{1}{4}} - 3 + 3x^{-\frac{1}{4}} - 6x^{\frac{1}{4}}$ by $x^{-\frac{1}{4}} - 2x^{\frac{1}{4}}$ and find the value of the result when $x = 8$. [9, 3½]

6 *a* Determine k so that the roots of the equation $4x^2 - (k+3)\,x + k = 0$ will be equal. [4]

b Determine the least integral value of m that will make the roots of the equation $3x^2 - 6x + m = 0$ imaginary. [5]

c Form the quadratic equation whose roots are $2 + \sqrt{6}$ and $2 - \sqrt{6}$. [3½]

7 The dimensions of a rectangular solid expressed in inches are represented by three consecutive numbers. If the total surface of the solid is 292 square inches, find the dimensions. [12½]

8 Find the roots of the equation $2x^2 - 11x + 3 = 0$ correct to the *nearest tenth*. [12½]

9 The arithmetic mean between two numbers is 10 and the geometric mean between the same two numbers is 6. Find the numbers. [12½]

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

$$\begin{aligned} xy + 2x &= 5 \\ 2xy - y &= 3 \end{aligned} \qquad [10, 2\tfrac{1}{2}]$$

11 A girl has a manuscript of 9900 words to transcribe. She can type on an average 36 words a minute more than she can write in longhand. If she saves 3 hours by using the typewriter, find her average rate per minute on the machine. [12½]

12 Using the same set of axes, represent graphically *each* of the following equations and from the graph determine the solutions that the two equations have in common:

$$\begin{aligned} 3x + 5y &= 15 \\ y &= x^2 - 3x + 2 \end{aligned} \qquad [3, 7\tfrac{1}{2}, 2]$$