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 \( a^m - 14ab + 49b^6 \) \( \quad [3] \)
b Factor \( 2ab - 6c - 3b + 4ac \) \( \quad [3] \)
c Factor \( 6a^2 + 5x^2 - 17x - 6 \) \( \quad [3] \)
d A man sells a house for \( m^2 \) dollars in cash. From the proceeds he pays a debt of \( n^2 \) 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? \( \quad [3\frac{1}{2}] \)

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

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

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

\[
\frac{7.826 \times \sqrt{784}}{(0.843)^4 \times .03783} \quad [12\frac{1}{2}]
\]

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. \( \quad [12\frac{1}{2}] \)

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

6 a Determine \( k \) so that the roots of the equation

\( 4x^2 - (k + 3)x + k = 0 \) will be equal. \( \quad [4] \)
b Determine the least integral value of \( m \) that will make the roots of the equation \( 3x^2 - 6x + m = 0 \) imaginary. \( \quad [5] \)
c Form the quadratic equation whose roots are \( 2 + \sqrt{6} \) and \( 2 - \sqrt{6} \). \( \quad [3\frac{1}{2}] \)

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. \( \quad [12\frac{1}{2}] \)

8 Find the roots of the equation \( 2x^2 - 11x + 3 = 0 \) correct to the nearest tenth. \( \quad [12\frac{1}{2}] \)

9 The arithmetic mean between two numbers is 10 and the geometric mean between the same two numbers is 6. Find the numbers. \( \quad [12\frac{1}{2}] \)

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

\[
xy + 2x = 5 \\
2xy - y = 3 \quad [10, 2\frac{1}{2}]
\]

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. \( \quad [12\frac{1}{2}] \)

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:

\[
3x + 5y = 15 \\
y = x^2 - 3x + 2 \quad [3, 7\frac{1}{2}, 2]
\]