195th HIGH SCHOOL EXAMINATION

ADVANCED ALGEBRA

Monday, June 14, 1909—9.15 a. m. to 12.15 p. m., only

Answer seven questions. Each complete answer will receive 14⅓ credits. No credit will be allowed unless all operations (except mental ones) necessary to find results are given.

1 Three numbers, whose sum is 24, are in arithmetic progression; if 2, 6, 11 are added to them respectively, the results are in geometric progression. Find the numbers.

2 Form the equation of the fourth degree with rational coefficients, three of whose roots are 2, -3, $3 + 2\sqrt{-1}$

3 Find the first five terms of the series obtained by developing the fraction $\dfrac{1-x}{1+2x+2x^2}$ by the method of undetermined coefficients. Verify the result by division.

4 In a certain county there are 15 candidates for State scholarships; in how many ways may 5 scholarships be awarded to 2 girls and 3 boys if 6 of the candidates are girls and 9 are boys?

5 The distance through which a body falls varies as the square of the time of falling. A stone dropped from a window 36 feet 1 inch above the ground strikes the ground in 1½ seconds; one dropped from a bridge strikes the water below in 4½ seconds. Find the hight of the bridge above the water.

6 Plot the graph of $2x^3 + 3x^2 - 10x - 7 = y$ and from the graph determine the location of the roots of the equation formed by making $y=0$.

7 Given log $2=0.30103$, log $3=0.47712$, log $7=0.84510$; find the logarithms of 84, 81, $\sqrt[7]{7}$, 500, ⅔.

8 By Horner's method of approximation find the root, correct to *two* decimal places, between 1 and 2 of
$$x^3 - 9x^2 + 23x - 16 = 0$$

9 By determinants find the value of x in the following system of equations:
$$x + 2y + 3z = 1$$
$$2x - y - 2z = 8$$
$$3x + 3y - z = -5$$

10 By the orders of differences find the 10th term and the sum of the first 10 terms of the series 1, 3, 8, 16 . . .