

ADVANCED ALGEBRA

Monday, June 17, 1907—9.15 a. m. to 12.15 p. m., only

Answer eight questions. Give all operations (except mental ones) necessary to find results. Reduce each result to its simplest form and mark it Ans.

1 Define logarithm, graph, incommensurable roots, exponent, interpolation.

2 Resolve into partial fractions $\frac{12x^2-11x-3}{(x+1)^2(x^2+3)}$

3 One root of the equation $6x^4-13x^3-35x^2-x+3=0$ is $2+\sqrt{3}$; find the other roots.

4 In how many ways can 10 boys be arranged in a row if one particular boy is not permitted to stand at either end of the row?

5 Divide $3x^4-48$ by $3x-6$, by synthetic division.

6 By the method of differences find the eighth term and the sum of the first eight terms of the series, 4, 14, 30, 52, 80.

7 Given $\log 3=0.47712$, how many digits in 3^{40} ?

8 Evaluate the determinant $\begin{Bmatrix} 2 & 3 & 1 \\ 1 & 7 & 4 \\ 2 & 2 & 3 \end{Bmatrix}$ and state fully how

the signs of the terms of the development are determined.

9 By the binomial formula find the cube root of 9 to three places of decimals.

10 What conclusions regarding the roots of the following equations can be drawn by aid of Descartes's rule?

(a) $x^4+2x^2-3x-1=0$, (b) $x^4+2x^2+1=0$,

(c) $x^5+2x^3-x+3=0$

11 Transform $2x^3-9x^2+4x+6=0$ into an equation wanting the second term and then transform the derived equation into another whose coefficients are all integers, that of the highest exponent being unity. How do the roots of the final equation differ from the roots of the given equation?

12 If a body is projected horizontally with a velocity of 80 feet a second, the curve which it describes is represented by the equation $S=\frac{1}{2}gt^2$ in which S represents the vertical height through which the body has fallen, t the number of seconds that have elapsed since it was projected and g the acceleration of gravity. Plot the path of the projectile for the first 5 seconds, assuming that $g=32$ feet.