The University of the State of New York

217TH HIGH SCHOOL EXAMINATION

ADVANCED ALGEBRA

Monday, June 18, 1917—9.15 a. m. to 12.15 p. m., only

Write at top of first page of answer paper (*a*) name of school where you have studied, (*b*) number of weeks and recitations a week in (1) elementary algebra, (2) intermediate algebra, (3) advanced algebra.
The minimum time requirement is five recitations a week in algebra for two school years.

Answer eight questions. Each answer should be reduced to its simplest form.

1 *a* The roots of the equation

$$x^5-3x^4-5x^3+15x^2+4x-12=0$$

are all real; determine the number of positive roots and the number of negative roots.

b Find all the roots of the equation

$$x^5-13x^4+67x^3-171x^2+216x-108=0$$

2 Given the equation $x^3-3x+1=0$, find by Horner's method the positive root the first figure of which is 1. Carry the result to *two* decimal places.

3 One root of the equation $3x^4-10x^3+4x^2-x-6=0$ is $\frac{1}{2}(1+\sqrt{-3})$. Find the other roots.

4 *a* Form the equation in x whose roots are $\frac{4}{3}$, $\frac{3}{2}$ and $1\pm\sqrt{2}$ and express the result with integral coefficients.

b Solve the equation $2x^4-5x^3+5x-2=0$

5 Given the equation $x^3-px+15=0$, determine the values of p so that the difference of the squares of the two roots shall be equal to 16.

6 Plot the graphs of the equations

$$x^2+y=3$$
$$x+y^2=5$$

and determine exactly or approximately all the values of x and y that satisfy both equations.

7 Of the arrangements possible with the letters of the word *Regents*, in which one letter is repeated, state (*a*) in how many ways the letters can be arranged in a line, (*b*) in how many ways beginning with a consonant the letters can be arranged in a line.

8 Reduce $\frac{12-5i}{2-3i}$ and $\frac{-(7+9i)}{2(1+i)^2}$ to simplest form and represent graphically their sum and their difference.

9 Find the sum of (*a*) the first n odd numbers, (*b*) the first n even numbers, (*c*) the first n numbers divisible by 3, (*d*) the first n numbers which when divided by 5 have each a remainder 1.

10 The dimensions of a rectangular solid, expressed in inches, are consecutive integers; if each dimension is increased 1 inch, the volume is increased 75%. Find the dimensions.

11 Show that it is impossible to find three consecutive integers such that the product of the first two shall equal the second minus the third.

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DIRECTIONS FOR RATING

The direction, "Less than 60% of the credit should be granted when an error in computation occurs," should be followed in rating all incorrect answers to questions which fall under the topics mentioned in "Suggestions on the Rating of Regents Examination Papers in Mathematics" under "General 3."

In all problems solved with two unknowns no credit should be given for one equation correctly formed if the other is not given or is inaccurate.

Except in schools where the "committee system" is used, teachers are urged to mark papers cumulatively, that is, to add the credits earned by each answer to the total credits earned by preceding answers so that the mark given to the last answer is the per cent to which the paper is entitled, e. g. consecutive answers earning 5, 7, 4 etc. respectively should be marked 5, 12, 16 etc. respectively.

1 12½ credits

a Allow 5 credits, 2½ for number of positive roots and 2½ for number of negative roots.

b 7½ credits. Allow 1½ credits for each root.

2 12½ credits

Allow 5 credits for finding second figure of root correctly.

Allow 7½ credits for finding third figure of root correctly.

3 12½ credits

Allow 2½ credits for finding conjugate root.

Allow 10 credits for finding other two roots (5 each).

4 12½ credits

a 6½ credits. Allow 3 credits if one mechanical error is made. Allow no credit if more than one mechanical error is made.

b 6 credits. Allow 1½ credits for each root.

5 12½ credits

Allow 4½ credits for correct equations.

Allow 8 credits for correct values of p (2 each).

6 12½ credits

Allow 6½ credits for correct graphs.

Allow 6 credits for determining roots exactly or to nearest tenth.

7 12½ credits

a 6 credits. Allow no partial credit.

b 6½ credits. Allow no partial credit.

8 12½ credits

Allow 6½ credits for rationalizing denominators, 3 for first and 3½ for second.

Allow 6 credits for graphs, 3 for sum and 3 for difference.

9 12½ credits

a Allow 3 credits.

b Allow 3 credits.

c Allow 3 credits.

d Allow 3½ credits.

10 12½ credits

Allow 7½ credits for correct equation.

Allow 3 credits for first correct value.

Allow 2 credits for other two correct values (1 each).

11 12½ credits

Allow 6½ credits for correct equation.

Allow 6 credits for correct solution and deduction.