

The University of the State of New York

251ST HIGH SCHOOL EXAMINATION

ADVANCED ALGEBRA

Thursday, June 18, 1931 — 9.15 a. m. to 12.15 p. m., only

Instructions

Do not open this sheet until the signal is given.

Answer all questions in part I and five questions from part II.

Part I is to be done first and the maximum time to be allowed for this part is one and one half hours. Merely place the answer to each question in the space provided; no work need be shown.

If you finish part I before the signal to stop is given you may begin part II. However, it is advisable to look your work over carefully before proceeding to part II, since *no credit will be given any answer in part I which is not correct and reduced to its simplest form.*

When the signal to stop is given at the close of the one and one half hour period, work on part I must cease and this sheet of the question paper must be detached. The sheets will then be collected and you should continue with the remainder of the examination.

ADVANCED ALGEBRA

Thursday, June 18, 1931

Fill in the following lines:

Name of school.....Name of pupil.....

Detach this sheet and hand it in at the close of the one and one half hour period.

Part I

Answer all questions in this part. Each question has 2½ credits assigned to it; no partial credit should be allowed. Each answer must be reduced to its simplest form.

- 1 For what values of x will the expressions $2 - 4x$ and $\frac{x^2 + 6}{x + 3}$ have the same value? Ans.
- 2 If $y = x + 7 - \sqrt{x^2 + 5}$, what value of x would give y the value 2? Ans.
- 3 If $2^x = \frac{1}{8}$, what is the value of x ? Ans.
- 4 Express the decimal .545454... as a common fraction. Ans.
- 5 Write the first three terms of the expansion of $(x - \frac{1}{2})^9$ Ans.
- 6 Find the value of $10^{2.4014}$ Ans.
- 7 Find the logarithm of .8743 Ans.
- 8 Find the logarithm of the reciprocal of .8743 Ans.
- 9 If $\log_{10} x + \log_{10} 5 = 2$, find the value of x . Ans.
- 10-15 Given the equation $5x^2 + 2x - 4 = 0$
 - a What is the sum of the roots? Ans. a.
 - b What is the product of the roots? b.
 - c How many roots are negative? c.
 - d How many roots are real? d.
 - e Form a new equation whose roots are less by 2 than the roots of this equation. e.
 - f Transform the given equation into a new equation whose coefficients are integers, the coefficient of the highest power being unity. f.
- 16-17 a If $x = 2 - i$, what is the value of the fraction $\frac{x^2 + 1}{x - 1}$? Ans. a.
 - b What other value of x would give the same value to the fraction? b.
- 18 A can do twice as much work in a day as B. Letting x represent the number of days it takes A to do a piece of work and y the number of days it takes A and B together to do the same work, write an equation showing the relation between y and x . Ans.
- 19 How many numbers between 100 and 1000 can be written with the digits 0, 1, 2, 3, 4, if no digit may be repeated in any one number? Ans.
- 20 How many different committees of two men and one woman can be picked from an organization of 7 men and 4 women? Ans.

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.

Part II

Answer five questions from this part. 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.

In the examination in advanced algebra the use of the slide rule will be allowed for checking, provided all computations with tables are shown on the answer paper.

- 21 Find all the roots of the equation
 $3x^3 + 5x^2 + 5x + 2 = 0$ [10]
- 22 The cube of a certain number exceeds the number itself by 9; find the number correct to the nearest hundredth. [10]
- 23 In how many years will \$300 at 5% interest compounded annually amount to \$624? [10]
- 24 Solve the following set of equations and correctly group your answers:
 $x^2 - 8xy = -15$
 $3xy + y^2 = 10$ [8, 2]
- 25 Two men, A and B, receive different wages. A earns \$84 and B \$80. If A had received B's wages per day, and B had received A's wages, they would have earned together \$8 more. How many days does each work, if A works 8 days more than B? [6, 4]
- 26 An island is 4 miles out from the nearest point P of a straight shore and a town T is on the shore 7 miles from P . A man walks from T toward P at the rate of 4 miles an hour until he finds a boat, and then rows straight to the island at the rate of 3 miles an hour. He finds that the entire trip from T to the island has taken 2 hours and 40 minutes. How many hours did he walk? [7, 3]
- 27 The length of a rectangular box is to be 2 inches greater than its width, and its width 2 inches greater than its depth.
- Letting y represent its volume in cubic inches and x its depth in inches, express y as a function of x . [2]
 - Plot the graph of the equation formed in answer to a for values of x from 0 to 4 inclusive. [6]
 - From the graph made in answer to b find what depth the box should have to make its volume 150 cubic inches. [2]