The University of the State of New York

295TH HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Thursday, August 23, 1945 — 8.30 to 11.30 a. m., only

Instructions

Part I is to be done first and the maximum time allowed for it is one and one half hours. At the end of that time, this part of the examination must be detached and will be collected by the teacher. If you finish part I before the signal to stop is given, you may begin part II.

Write at top of first page of answer paper to parts II, III and IV (a) names of schools where you have studied, (b) number of weeks and recitations a week in intermediate algebra previous to entering summer high school, (c) number of recitations in this subject attended in summer high school of 1945 or number and length in minutes of lessons taken in the summer of 1945 under a tutor licensed in the subject and supervised by the principal of the school you last attended.

The minimum time requirement is five recitations a week for half a school year after the completion of elementary algebra. The summer school session will be considered the equivalent of one semester's work during the regular session or five recitations a week for half a school year.

For those pupils who have met the time requirement, the minimum passing mark is 65 credits; for all others 75 credits.

For admission to this examination attendance on at least 30 recitations in this subject in a registered summer high school in 1945 or an equivalent program of tutoring approved in advance by the Department is required.

Part II

Answer three questions from part II.

26 Find, correct to the *nearest tenth,* the roots of the equation $5x^2 - x - 1 = 0$ [10]

27 Solve the following set of equations, group your answers and check: [7, 2, 1]
$$x^2 - 4x + 9 = y$$
$$2x - y = 0$$

28 Using logarithms find, correct to the *nearest tenth,* the value of L from the formula $L = \dfrac{t^2 g}{4\pi^2}$ when $t = 2.50$ [Use $g = 32.2$ and $\pi = 3.14$]   [10]

29   a   Draw the graph of $y = x^2 - 3x$ from $x = -2$ to $x = 5$ inclusive.   [8]
     b   Write the equation of its axis of symmetry.   [1]
     c   Write the coordinates of the minimum point.   [1]

*30   a   Find, correct to the *nearest tenth,* the value of x that satisfies the equation $123^x = 45.8$ [7]
     b   What is the name of the type of equation given in *a*?   [1]
     c   Write .00042 as the product of 4.2 and a power of 10.   [2]

*This question is based on one of the optional topics in the syllabus.

Part III

Answer one question from part III.

31 Write the equations that would be used in solving the following problems. In *each* case state what is represented by the letter or letters you use. [Solution of the equations is not required.]

    a How much water must be added to 10 quarts of alcohol that is 95% pure in order to obtain a solution that is only 50% pure? [4]

    b A man and a boy started at the same time and walked from A to B, a distance of 12 miles. The man walked half a mile an hour faster than the boy and reached B 48 minutes earlier than the boy. Find the average rate at which *each* walked. [6]

32 Some girls rented a cottage for $60. Just before they moved in, another girl joined them. This reduced by $2 the amount of rent each of the original group of girls had expected to pay. How many girls occupied the cottage? [5, 5]

Part IV

Answer one question from part IV.

33 *a* If the second term of an arithmetic progression is 7 and the tenth term is 19, what is the first term? [2]

    b Write the equation of a parabola that does not intersect the x axis. [2]

    c If log 4 x is equal to 3.4000, find x correct to the *nearest integer*. [2]

    d Solve the equation $x^{-\frac{1}{2}} = \frac{1}{8}$ [2]

    e If $x = 4 + \dfrac{y}{2}$, by how much is x increased when $\frac{1}{2}$ is added to y? [2]

34 *a* Explain the effect upon the graph of $y = mx + b$ when m remains constant and b varies. [5]

    b Explain the effect upon the graph of $y = mx + b$ when b remains constant and m varies. [5]

INTERMEDIATE ALGEBRA

Fill in the following lines:

Name of school..Name of pupil..

Part I

Answer all questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Each answer must be reduced to its simplest form.

1 What is the name of the graph of $2x^2 + 3y^2 = 8$? 1................

2 Factor $x^3 - x$ 2................

3 From $\dfrac{1}{x-y}$ subtract $\dfrac{2}{y-x}$ 3................

4 Express $\sqrt{-4}$ and $\sqrt{-9}$ in terms of i and add the results. 4................

5 Express $\dfrac{3}{\sqrt{3}-1}$ as an equivalent fraction with a rational denominator. 5................

6 What is the sum of the roots of the equation $9x^2 - 2x + 1 = 0$? 6................

7 Find the value of $32^{\frac{2}{3}}$ 7................

8 Find the logarithm of 1.986 8................

9 Find the 4-digit number whose logarithm is 0.8875 9................

10 If $\log x = a$, express $\log \sqrt[3]{x}$ in terms of a. 10................

11 Find the value of x which satisfies the equation $\sqrt{x^2 - 1} = x + 1$ 11................

12 If it takes h hours to walk a certain distance at the rate of 3 miles per hour, how many hours will it take to return the same distance at the rate of 2 miles per hour? 12................

13 Find the sum of the infinite geometric progression 10, 5, $2\frac{1}{2}$, ... 13................

14 What is the value of $\log 100\, x - \log x$? 14................

15 Find the value of 1.2×10^{-2} 15................

16 What value must be given to a to make the roots of the equation $ax^2 - 2x + 1 = 0$ equal? 16................

17 Find the sum of the first 13 terms of the series 1, 8, 15, ... 17................

18 Insert two geometric means between 4 and -32. 18................

19 Write the first two terms of the expansion of $(x^2 - 2y)^4$. 19................

20 Solve the formula $L = \dfrac{Mt - g}{g}$ for M. 20................

21 Write the linear equation expressing the relation between x and y shown in the following table:

x	2	6	12	18
y	5	13	25	37

21................

[3] [OVER]

INTERMEDIATE ALGEBRA

Directions (questions 22–25) — Indicate the correct answer to *each* question by writing on the line at the right the letter *a, b* or *c*.

22 The roots of the equation $x^2 - 5x + 6 = 0$ are (*a*) —2 and —3, (*b*) 2 and 3, (*c*) —6 and 1

22......

23 An example of an irrational number is (*a*) $\sqrt[3]{1000}$, (*b*) $\sqrt[3]{-8}$, (*c*) $\sqrt{2}$

23......

24 The tangent of the acute angle which the graph of $x - y = 3$ makes with the x axis is (*a*) greater than 1, (*b*) less than 1, (*c*) equal to 1

24......

25 A lighthouse built at sea level is 140 feet high. From its top, the angle of depression of a buoy is 20°. The distance from the buoy to the foot of the lighthouse is approximately (*a*) 51 feet, (*b*) 48 feet, (*c*) 385 feet

25......