The University of the State of New York

310TH HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Wednesday, August 23, 1950 — 12 m. to 3 p. 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 1950 or number and length in minutes of lessons taken in the summer of 1950 under a tutor licensed in the subject and supervised by the principal of the school you last attended.

The minimum time requirement is four or 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 (four 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 1950 or an equivalent program of tutoring approved in advance by the Department is required.

Part II

Answer three questions from part II.

26 Find, to the *nearest tenth,* the roots of the equation $2x^2 - 8x - 3 = 0$ [10]

27 Solve the following system of equations, group your answers and check *both* sets:

$$x^2 + xy = 12$$
$$2x + y = 7$$ [7, 1, 2]

28 In the formula $T = \pi \sqrt{\frac{l}{g}}$, $g = 32.2$, $\pi = 3.14$. If $l = 2.16$, find by the use of logarithms the value of T to the *nearest hundredth.* [10]

29 *a* On the same set of axes draw the graphs of $y = x^2 - 3x$ and $x + y = 2$ [6, 2]

b From the graphs made in answer to *a,* estimate, to the *nearest tenth,* the values of x and y common to the two equations. [2]

*30 Solve the following system of equations for x, y and z:

$$\begin{aligned} x + 2y + z &= 7 \\ 3x - y + 2z &= 11 \\ 2x + 3y - 3z &= -2 \end{aligned}$$ [10]

*31 Find the roots of the equation:

$$2x^3 + 3x^2 - 11x - 6 = 0$$ [10]

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

Part III

Answer one question from part III.

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

a Flying with the wind, an airplane can travel 480 miles in 2 hours. Returning against the wind, it requires 3 hours to travel the same distance. Find the speed of the plane in calm air. [5]

b A group of boys decided to buy a motor boat that cost $240. When 2 more boys joined the group it was found that each boy had to pay $4 less. How many boys were in the original group? [5]

33 How much pure alcohol must be added to 3 quarts of a 7% solution of alcohol and water to make it a 28% solution? [10]

Part IV

Answer one question from part IV.

34 For each of the following statements indicate whether the information given is *too little, just enough,* or *more than is necessary,* to justify the conclusion.

a If in the equation $y = x^2 - 4x - c$ the value of c is known, then the axis of symmetry of the graph of $y = x^2 - 4x - c$ can be found. [2]

b If $a = 0$ and $b = 0$, then $ab = 0$ [2]

c If, in the equation $y = ax^2 + bx + c$, b^2 is less than $4ac$, the graph of the equation does not intersect the x-axis. [2]

d If a is a real number, then a^2 is greater than a. [2]

e If, in the equation $ax + by = c$, a and b are opposite in sign, then y always increases as x increases. [Consider a, b and c real numbers.] [2]

35 Two points A and B are on the sides of a right angle whose vertex is C. $AC = 6$ feet and $BC = 11$ feet. A starts to move away from C at 2 feet per second, and at the same time B starts to move toward C at the same rate of speed.

a How far is A from C at the end of x seconds? [2]

b How far is B from C at the end of x seconds? [2]

c Write an equation expressing the fact that the distance between A and B is 13 feet at the end of x seconds. [4]

d Find the value of x in the equation written in answer to *c*. [2]

Fill in the following lines:

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

Part I

Answer all questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed.

1 Factor $x^2 - .16$ 1.....

2 Express, in terms of i, one of the roots of the equation $x^2 + 3 = 0$ 2.....

3 Solve the equation $2\sqrt{x} + 1 = 6$ 3.....

4 Write $\frac{1}{3-\sqrt{2}}$ as a fraction with a rational denominator. 4.....

5 Find the logarithm of 0.7352 5.....

6 Find the number whose logarithm is 1.7416 6.....

7 Simplify the complex fraction $\frac{a + \frac{a}{b}}{1 + \frac{1}{b}}$ 7.....

8 Express as a single fraction in its simplest form the sum of $\frac{3}{c-d}$ and $\frac{2}{d-c}$ 8.....

9 Write the first *three* terms in the expansion of $(x + y)^6$ 9.....

10 Write an equation of the straight line which passes through the points whose coordinates are given in the following table:

x	0	2	4	5
y	2	6	10	12

10.....

11 Find the y-intercept of the straight line whose equation is $y = 2x + 3$ 11.....

12 Find the sum of the roots of the equation $3x^2 - 5x - 21 = 0$ 12.....

13 Solve the formula $T = \pi r(l + r)$ for l. 13.....

14 One factor of $(x + y)^2 + c(x + y)$ is $(x + y)$. Find the other factor. 14.....

15 Find the value of $8^{\frac{1}{3}} + 4^0 + 3^{-1}$ 15.....

16 If y varies directly as x and $x = 8$ when $y = 12$, find the value of x when $y = 18$ 16.....

17 If 2 and 54 are the first and the fourth terms respectively of a geometric progression, find the ratio. 17.....

18 Find the sum of the first 15 terms of the progression —26, —22, —18, ... 18.....

19 Find the sum of the infinite geometric progression 2, 1, $\frac{1}{2}$, ... 19.....

20 A flagpole stands on level ground. The angle of elevation of the top of the flagpole at a point 100 feet from the foot of the pole is 31°. Find, to the *nearest foot,* the height of the pole. 20.....

[OVER]

Directions (questions 21–25) — Indicate the correct answer to *each* of the following by writing the letter *a*, *b* or *c* on the line at the right.

21 If the perimeter of a rectangle is $4a$ and its length is b, then its width is

(*a*) $4a - b$ (*b*) $2a - b$ (*c*) $\frac{4a}{b}$ 21.....

22 The product of $2^a \times 2^b$ is (*a*) 4^{a+b} (*b*) 2^{a+b} (*c*) 2^{ab} 22.....

23 If the discriminant of a quadratic equation is 21, then the roots of the equation are (*a*) real and equal (*b*) rational and unequal (*c*) real and unequal 23.....

24 The graph of the equation $10x^2 + y^2 = 100$ is (*a*) a circle (*b*) an ellipse (*c*) a hyperbola 24.....

25 If $\log N = k$, then $\log 100\ N$ equals (*a*) $2 + k$ (b) $100\ k$ (*c*) $2\ k$ 25.....