The University of the State of New York

303D HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Wednesday, June 23, 1948 — 9.15 a. m. to 12.15 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*) name of school where you have studied, (*b*) number of weeks and recitations a week in intermediate algebra.

The minimum time requirement is four or five recitations a week for half a school year after the completion of elementary algebra.

Part II

Answer three questions from part II.

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

27 Solve the following system of equations and group your answers: [8, 2]

$$2x^2 + y^2 = 17$$
$$2x + y = 1$$

28 Using logarithms, find d to the *nearest tenth:* [10]

$$d = \frac{\sqrt[3]{372} \times \tan 15°}{6.97}$$

29 *a* Draw the graph of $y = x^2 - 3x - 2$ from $x = -1$ to $x = 4$ inclusive. [5]

b Write the equation of the axis of symmetry of the graph made in answer to *a*. [2]

c From the graph, estimate to the *nearest tenth* the minimum value of y. [1]

d From the graph, estimate to the *nearest tenth* the roots of the equation $x^2 - 3x - 2 = 0$ [2]

*30 Solve the following system of equations for x, y and z: [10]

$$2x + y = 1$$
$$4x + z = 1$$
$$4y - z = 5$$

*31 *a* If $2^x = 9$, find x to the *nearest tenth.* [5]

b If $x - 2$ is a factor of $x^3 + kx^2 - 3x + 10$, find the value of k. [5]

* This question is based on 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 A chemist wants to change 8 ounces of a 25% solution of argyrol to a 10% solution. How many ounces of water should he add? [5]

b The area of a rectangular plot of ground is 80 square rods. If its length is 1 rod longer than 3 times its width, find the dimensions of the plot. [5]

33 When a dealer heard that the price of a certain product was about to advance $3 per barrel, he bought a number of barrels of this product for $300. Had he bought at the new price, he would have obtained 5 barrels fewer for the same money. How many barrels did he buy? [6, 4]

Part IV

Answer one question from part IV.

34 *a* If the quotient of two numbers is —1, find the sum of the numbers. [2]

b Write the equation of the circle whose center is at the origin and which passes through the point (0, 4). [2]

c Write an equation which shows that a, b and c are three numbers in arithmetic progression. [2]

d Express the number .0000032 as a product of 3.2 and a power of 10. [2]

e If $\log m + \log m^2 = \log 27$, find the value of m. [2]

35 A camp is x miles up the river from town. A group of campers row to town and back again, the round trip taking h hours. The river flows at the rate of c miles an hour and the campers can row at the rate of d miles an hour in still water.

a Express in terms of x, c and d the time required to row (1) up the river, (2) down the river. [2, 2]

b Write the equation which can be used to solve for x in terms of h, c and d. [3]

c Solve for x the equation written in answer to *b*. [3]

INTERMEDIATE ALGEBRA

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. Each answer must be reduced to its simplest form.

1 Combine $3\sqrt{-9} - 2\sqrt{-1}$ and express the result in terms of i. 1.....

2 Solve for x the equation $\sqrt{6x + 1} = 7$ 2.....

3 Find the logarithm of 4643 3.....

4 If $\log N = 1.4643$, find N to the *nearest hundredth.* 4.....

5 Find the value of $9^{-3/2}$ 5.....

6 Solve the following set of equations for u:

$$t = u + 2$$
$$10t = 14u$$

6 $u =$.....

7 Solve for m the formula $T = mg - mf$ 7 $m =$.....

8 In slight stretching of elastic bodies, the stretch varies directly as the force. If a spring is stretched 1 inch by a force of 25 pounds, find the amount of stretch produced by a 15-pound force. 8.....

9 The denominator of a certain fraction is $(a - 3)(a + 2)$. When reduced, the fraction becomes $\frac{2}{a - 3}$. Find the *numerator* of the original fraction. 9.....

10 Express $\frac{1}{5 - \sqrt{3}}$ as an equivalent fraction with a rational denominator. 10.....

11 Express by an equation the relationship between x and y shown by the following table:

x	-1	0	4	8
y	-3	-1	7	15

11.....

12 Write the equation of the line whose slope is 3 and whose y-intercept is 5. 12.....

13 *How many* terms are there in the expansion of $(a + 1)^7$? 13.....

14 Find the product of the roots of the equation $9x^2 - 3x + 4 = 0$ 14.....

15 The first term of an arithmetic progression is 5 and the second term is 7. Find the sum of the first 10 terms. 15.....

16 If 2 and 54 are the first and fourth terms respectively of a geometric progression, find the *second* and *third* terms. 16.....

17 Find the sum of the infinite progression $3, 1, \frac{1}{3}, \ldots$ 17.....

18 Simplify the complex fraction: $\dfrac{a - \frac{1}{b}}{a + \frac{1}{b}}$ 18.....

[OVER]

Directions (questions 19–21) — Indicate the correct answer to *each* question by writing on the line at the right the letter *a*, *b* or *c*.

19 The expression $\log \frac{\sqrt{a}}{b}$ is equal to

(*a*) $\frac{1}{2}(\log a - \log b)$ (*b*) $\frac{1}{2}\log a - \log b$ (*c*) $\frac{1}{2}\log (a - b)$ 19.....

20 Which of the following is an imaginary number? (*a*) $-\sqrt{3}$ (*b*) $\sqrt{-3}$ (*c*) $\sqrt[3]{-3}$ 20.....

21 A set of answers which satisfies the system of equations

$$2x + 3y = 0$$
$$x^2 + 2xy = -3$$

is (*a*) $x = -6, y = 4$ (*b*) $x = 3, y = -2$ (*c*) $x = -2, y = 3$ 21.....

Directions (questions 22–25) — For *each* of the following, if the statement is *always* true, write the word *true* on the line at the right; if it is *not always* true, write the word *false*.

22 The sum of the roots of the equation $ax^2 + 3x + c = 0$ is -3 22.....

23 The graph of $ax^2 + ay^2 = 16$ is a circle when a is positive. 23.....

24 The equation $3x^2 + bx - 5 = 0$ has real roots. 24.....

25 The value of $3(a + b)^0$ is 3 25.....