The University of the State of New York

262D HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Thursday, January 24, 1935 — 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 write the answer to each question in the space at the right; 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.

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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 Factor $3x^2 - 5x - 12$ *Ans*.....

2 Multiply a^x by a^{1-x} *Ans*.....

3 Solve for l the formula $S = \pi r^2 + \pi rl$ *Ans*.....

4 Find the logarithm of the number 27.76 *Ans*.....

5 Given $\log \cos A = 9.9874 - 10$; find the acute angle A correct to the *nearest degree*. *Ans*.....

6 What is the name of the curve represented by the equation $xy = 16$? *Ans*.....

7 Are the roots of the equation $2x^2 - 3x - 1 = 0$ rational or irrational? *Ans*.....

8 Express $\frac{3}{\sqrt{3}-1}$ as a fraction with rational denominator. *Ans*.....

9 Find the value of the expression $x^{\frac{2}{3}} - 3x^0$, if $x = 8$ *Ans*.....

10 Insert *three* arithmetic means between -3 and 5. *Ans*.....

11 If the roots of the equation $x^2 + px + q = 0$ are $2 - \sqrt{3}$ and $2 + \sqrt{3}$, what is the value of p? *Ans*.....

12 Write the first *three* terms of the expansion $(x^2 - 1)^6$ *Ans*.....

13 Find the sum of the infinitely decreasing series $8 + 4 + 2 + 1 + \ldots$ *Ans*.....

14 Simplify $(a^2 - \frac{a}{b}) \div (b - \frac{1}{a})$ *Ans*.....

15 In the right triangle ABC, angle $A = 20°$, angle $C = 90°$, $AC = 10.6$; find BC correct to the *nearest tenth*. *Ans*.....

16 Solve for x the equation $x + \sqrt{x^2 + 3} = 3$ *Ans*.....

17 If $x = (y + 1)^{-1}$, does x increase or decrease as y increases from zero? *Ans*.....

18 Write the equation of the straight line which has a slope of 2 and passes through the point (0, 4). *Ans*.....

19 Write the equation of the straight line passing through the points whose coordinates are given in the following table: *Ans*.....

x	0	1	2	3	...
y	-1	2	5	8	...

20 A printer charges \$10 for printing the first 100 copies of a certain pamphlet and 3¢ apiece for each pamphlet in excess of 100. Write a formula that expresses the cost (c) in dollars of printing n pamphlets, where n is greater than 100. *Ans*.....

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Write at top of first page of answer paper to part II (*a*) name of school where you have studied, (*b*) number of weeks and recitations a week in intermediate algebra.

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

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. Purely arithmetical solutions for problems will not be accepted.

In the examination in intermediate 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, correct to the *nearest tenth*, the roots of the equation

$$\frac{4}{x^2} + 2 = \frac{7}{x} \qquad [10]$$

22 Solve the following pair of simultaneous equations, correctly group your answers and check *one* set:

$$x^2 + y^2 = 13$$
$$2x + 3y = 0 \qquad [7, 2, 1]$$

23 The sum of \$500 is put into a bank and draws interest at 4%, compounded semiannually. Using logarithms, find the amount at the end of 20 years. [$A = P\,(1 + \frac{r}{2})^{2n}$, where A is the amount, P is the principal, r is the annual rate of interest and n is the number of years] [10]

24 Write the equations that would be used in solving any *two* of the following problems; in each case state what the unknown letter or letters represent: [Solution of the equations is not required.]

a The hypotenuse of a right triangle is 30 inches. The length of one leg exceeds the length of the other leg by 6 inches. Find the lengths of the two legs. [5]

b Find a two-digit number such that if the digits are reversed, the new number minus the original number is 36 and the product of the numbers is 765. [5]

c How many pounds of 50¢ candy and how many pounds of 30¢ candy must be used to make 100 pounds of mixed candy worth 35¢ a pound? [5]

d A train leaves New York for Buffalo at 9 a. m. and travels at an average rate of 40 miles an hour. At 11 a. m. another train leaves New York for Buffalo over the same route but at an average rate of 50 miles an hour. How far from New York will the second train overtake the first train? [5]

25 A man paid \$1800 for a herd of cows, paying the same amount for each cow. Five cows died. He sold the rest of the herd at \$20 more per cow than he paid, thereby making a total profit of \$200 on the whole transaction. How many cows did he buy? [6, 4]

26 A young man has a choice of two positions. The first position would yield a total salary of \$5000 over a period of 5 years. The second position pays \$400 for the first half year with a semiannual increase of \$25. Which position would yield the greater total salary for the 5 years and how much greater? [Solution by simple arithmetic not accepted] [10]

27 *a* Draw the graph of the equation $y = x^2 + x - 2$ from $x = -3$ to $x = +2$ inclusive. [6]

b Using the same set of axes as in *a*, draw the graph of the equation $2y = x + 4$ [2]

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

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

$$2x - y + 6z = 7$$
$$3x - 2y + 3z = 9$$
$$4x + 4y - 9z = 1 \quad [10]$$

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