INTERMEDIATE ALGEBRA

Thursday, June 16, 1927 — 9.15 a. m. to 12.15 p. m., only

———————

Fill in the following lines:

Name of school..Name of pupil..

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.

INTERMEDIATE ALGEBRA

Thursday, June 16, 1927

Part I

Answer all questions in this part. Each question has 2½ credits assigned to it. Each answer must be reduced to its simplest form.

1 Factor $x^3 + 8$ Ans............

2 Factor $x^2 - 2xy + y^2 - a^2$ Ans............

3 Factor $a^2 - 7a - 18$ Ans............

4 Simplify $\left(\dfrac{a^2}{b^2} - 1\right) \div a\left(\dfrac{a}{b} - 1\right)$ Ans............

5 Simplify $8^{-1} + 6^0 - 4^1$ Ans............

6 Express in terms of x the area of a square having the same perimeter as a rectangle whose dimensions are x and $3x$ respectively. Ans............

7 Rationalize the denominator in $\dfrac{3}{\sqrt[3]{4}}$ Ans............

8 Given log $2 = 0.3010$; find log $\sqrt[3]{2}$ Ans............

9 Solve for h the formula $d = \sqrt{2rh}$ Ans............

10 Solve the following equation for x:
$$x^2 - 2x = 15$$
Ans............

11 Form a quadratic equation whose roots are 4 and -3. Ans............

12 In an arithmetic progression $S = 8$, $a = -1$ and $l = 5$; find n. Ans............

13 In a geometric progression the first term is 2, the third term is 18 and the ratio is positive; find the ratio. Ans............

14 Express $\dfrac{2a^{-1} + 1}{a^{-1}}$ with positive exponents and simplify. Ans............

15 Express $\sqrt{-36}$ in terms of the imaginary unit i, that is, in terms of $\sqrt{-1}$ Ans............

16 One root of $x^2 + 3x + k = 0$ is -2; find k. Ans............

17 Solve for x:
$$\sqrt{2x - 14} - 4 = 0$$
Ans............

18 What geometric figure is obtained when the graph of $x^2 + y^2 = 4$ is plotted? Ans............

19 How long will it take a man to walk k miles if he walks x miles in y hours? Ans............

20 Write an equation in x and y whose graph is a straight line. Ans............

[2]

INTERMEDIATE ALGEBRA

Thursday, June 16, 1927

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 (1) elementary algebra, (2) intermediate algebra.

The minimum time requirement is five recitations a week for half a school year, or the equivalent, 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.

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 In an arithmetic progression the third and seventh terms are 7 and 15 respectively. Find the sum of the first 10 terms of this progression.   [10]

22 Find by the use of logarithms the value of t in $t = \pi \sqrt{\dfrac{l}{g}}$, when $\pi = 3.14$, $l = 11.65$ and $g = 32$.   [10]

23 *a* Factor $x^3 + 7x^2 - 36$ [5]

b Rationalize the denominator in $\dfrac{2\sqrt{3} - 1}{\sqrt{3} + 2}$ [5]

24 Solve for x and y, correctly group your answers and check one set:

$$x^3 - y^3 = 98$$
$$x - y = 2 \qquad [6, 2, 2]$$

25 An automobile radiator has a capacity of 4 gallons. It is filled with a mixture of water and alcohol of which 10% is alcohol. How much of the mixture must be drawn off and replaced by alcohol to have the radiator contain a mixture that is 25% alcohol?   [6, 4]

26 A man bought some books for $100. When the price advanced $2 on each book, he sold all the books but one for $108. How many books did he buy?   [6, 4]

27 Using the discriminant, determine the nature of the roots of

(a) $\dfrac{1}{x} = 1 - x$; (b) $3x^2 + x = 2$; (c) $4x(1 - x) = 1$ [3, 4, 3]

28 *a* Plot the graph of $y = x^2 - 2x + 3$ for values of x from $x = -3$ to $x = 5$ inclusive. [6]

b Plot the graph of $2x - y = 0$.   [2]

c From the graphs find the common solutions of the two equations.   [2]