ADVANCED ALGEBRA

Tuesday, September 7, 1920—9.15 a. m. to 12.15 p. m., only

Answer eight questions. Each answer should be reduced to its simplest form. Papers entitled to less than 75 credits will not be accepted.

1 Represent graphically the complex numbers $5+3i$ and $-1-6i$ and also represent their sum.

2 Transform the following equation into one whose roots are less by three: $3x^4-19x^3+21x^2+31x+12=0$

3 There are three numbers in geometric progression whose sum is $\frac{1}{1}$. If the first is multiplied by $\frac{2}{3}$, the second by $\frac{3}{4}$ and the third by $\frac{14}{15}$, the resulting numbers will be in arithmetic progression. What are the numbers?

4 Find to the *nearest hundredth* a root of the equation $x^3+4x^2+x+1=0$

5 In the equation $2kx^2+(5k+2)x+4k+1=0$, what is the value of k that will give equal roots?

6 Two airplanes fly toward each other, starting at the same time from places 500 miles apart. If the first one travels at a speed of 75 miles an hour, and the difference in the rates of speed is 21 miles more per hour than the number of hours before they meet, how far will each have traveled when they meet?

7 Find by logarithms the value of

$$50 \times \frac{2^{3.5}}{9^{1.63}} \times \sqrt[3]{2} \times 100^2 \text{ if } \log 2 = .3010$$

8 Find the equation of lowest degree with rational coefficients two of whose roots are $-5+2i$ and $-1+\sqrt{5}$

9 A rectangular piece of cloth when wet shrinks one sixth in length and one twelfth in width. If the area is diminished by $12\frac{3}{4}$ square feet and the perimeter by $6\frac{1}{2}$ feet, what are the original dimensions?

10 In how many different ways can two letters be posted in six letter boxes? In how many different ways can they be posted if they are not posted in the same box?