University of the State of New York

Examination Department

150TH EXAMINATION

PLANE TRIGONOMETRY

Thursday, January 27, 1898—9:15 a. m. to 12:15 p. m., only

100 *credits, necessary to pass,* 75

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Division of groups is not allowed. A, B and C represent the angles of a triangle, a, b and c the opposite sides, S the area. In a right triangle C represents the right angle and c the hypotenuse. Each complete answer will receive 10 credits.*

1 Define and illustrate *five* trigonometric functions.

2 Derive the formula for the area of a right triangle in terms of an angle and a side.

3 Express as a function of A *each* of the following: $\cos(180°-A)$, $\tan(180°+A)$, $\sec(270°-A)$, $\sin(270°+A)$, $\csc(360°-A)$.

4 Trace the variation, as an angle increases from 0° to 360°, in the value of (*a*) the cosine, (*b*) the tangent.

5–6 Given a triangle with $A=60°$, $B=45°$ and $c=96.59$ yards; find the numeric value of $\sin A$, $\sin B$, $\sin C$ correct to *four* decimal places and the numeric value of a and b correct to *two* decimal places.

7 Given $\tan A=-\frac{8}{15}$; find the value of *five* other functions of A.

8 Prove that $\tan(A+B)=\dfrac{\tan A+\tan B}{1-\tan A\tan B}$ [Assume values of $\sin(A+B)$ and $\cos(A+B)$]

9 Construct a right triangle with its hypotenuse 4 and the sine of one of its acute angles $\frac{2}{3}$.

10 Given log 2 = .3010, log 3 = .4771, log 5 = .6990, log 7 = .8451; find the logarithms of the following: $\frac{21}{16}$, 175, .0054, $(12)^{\frac{2}{3}}$, $\sqrt[4]{35}$.

11 Given log sin 18° = 9.4900, log tan 18° = 9.5118; find log cos 18°, log ctn 18°, log sin 36°.

12 How may an angle expressed in circular (or radius) measure be reduced to degrees? Prove. Find the value in circular measure of 120°.

13 Prove that the sides of a triangle are proportional to the sines of the opposite angles.

14–15 A surveyor wishes to find the distance and the hight of a tower which is on the same level with him but on the opposite side of an impassable chasm; illustrate the problem by a lettered figure and describe in detail the necessary measurements and computations.