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University of the State of New York

Examination Department

128th examination

PLANE TRIGONOMETRY

Thursday, March 14, 1895 — 9:15 a. m. to 12:15 p. m., only

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100 *credits, necessary to pass,* 75

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Answer questions 1-5 and five of the others but **no more.** *If more* **than** *five of these other questions are answered only the first five of these answers will be considered. In questions 3, 4-5, 10 and 12, A, B and C represent the angles of a triangle, a, b and c the opposite sides and 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 *cotangent, function of an angle, angle of fourth quadrant, supplement of an angle, horizontal angle.*

2 Construct the negative functions of an arc in the third quadrant; designate each negative function by name.

3 Construct a right triangle having $a=7$ and $\sec A=\frac{5}{3}$.

4-5 In a right triangle $c=42$ feet, and $\tan B=1.6$; find a, b, $\sin A$, $\cos A$ and S.

6 Given $\operatorname{ctn} A=-\frac{3}{4}$; find the values and signs of the other functions of A.

7 Find *six* trigonometric functions of $45°$.

8 Prove that $\cos(A+B)=\cos A \cos B-\sin A \sin B$.

9 Express in terms of $\tan A$ the other functions of A.

10 Prove that in any plane triangle $a^2=b^2+c^2-2bc \cos A$.

11 If $x=\dfrac{m}{n}$, prove that $\log(m+n)=\log n+\log(x+1)$; $\log(m-n)=\log n+\log(x-1)$.

12 In a triangle having $A=30°$ and $b=100$, how many solutions will there be when $a=30$, how many when $a=70$, how many when $a=50$? Explain each case.

13 Prove that $\tan A \operatorname{ctn} A=1$; $\sin^2 A+\cos^2 A=1$.

14 Prove that $\sin 2A=2 \sin A \cos A$; $\tan^2 \frac{1}{2} A=\dfrac{1-\cos A}{1+\cos A}$.

15 An inaccessible tower is on the same plane as the observer. Show what measurements must be made and what formulas are necessary to compute h, the hight of the tower and d, the distance from the observer to the tower.