University of the State of New York
Examinations Department
80th examination

PLANE TRIGONOMETRY

Thursday, March 17, 1892—9:15 a.m. to 12:15 p.m., only

40 credits, necessary to pass, 30

NOTE.—Draw carefully and neatly each figure, using letters instead of numerals. Arrange work logically.

1. Define (a) quadrant; (b) complement of an angle; (c) natural tangent; (d) logarithmic sine; (e) horizontal angle.

2. Name each function of an angle of a triangle which may be negative. State when the function would be negative and why.

3. Trace the changes in value and sign of \( \sin A \) as \( A \) increases from \( 0^\circ \) to \( 360^\circ \).

4. (a) Find the value of \( A \) when \( \cot \frac{1}{2} A = \tan A \).

   (b) When \( m = \tan A + \sin A \) and \( n = \tan A - \sin A \), prove that \( \frac{m-n}{m+n} = \cos A \).

5. Show how to find the value of \( \cos 30^\circ \) and \( \tan 15^\circ \) when \( \sin 30^\circ = \frac{1}{2} \).

6. Let \( A, B \) and \( C \) represent the angles of an oblique triangle and \( a, b \) and \( c \) their opposite sides respectively; prove that

   (a) \( \tan \frac{1}{2} (A + B) = \cot \frac{1}{2} C \).

   (b) \( a + b : a - b = \tan \frac{1}{2} (A + B) : \tan \frac{1}{2} (A - B) \).

7. Given \( a \) and \( b \) the adjacent sides of a parallelogram and \( C \) the included angle, to find the formula for computing (a) the longer diagonal; (b) the area.

8. A tree stands on an inaccessible hill. From a point \( N \) of a plain the angles of elevation to the top and the bottom of the tree are \( A^\circ \) and \( B^\circ \) respectively. At a point \( M \) of the plain, \( d \) feet back from \( N \) and in line with the tree, the angle of elevation to the top of the tree is \( C^\circ \). Show how to obtain the formula by which \( h \), the height of the tree may be computed.