University of the State of New York

Examinations Department

81st examination

PLANE TRIGONOMETRY

Thursday, June 16, 1892—9 : 15 a. m. to 12 : 15 p. m., only

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40 credits, necessary to pass, 30

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

1. Define and illustrate (*a*) quadrant; (*b*) cosecant; (*c*) function of an angle; (*d*) logarithmic tangent; (*e*) solution of a triangle.   5

2. Illustrate in a drawing each of the six functions of an arc in the third quadrant, indicating the name and the algebraic sign of each.   6

3. In what quadrants do the sine and tangent have unlike signs? In what quadrants do the secant and cosine have like signs?   4

4. Prove $\cos (A - B) = \cos A \cos B + \sin A \sin B$.   4

5. Prove that (*a*) $\sin^2 A + \cos^2 A = 1$; (*b*) $\cot (180° - A) = - \cot A$.   4

6. In a right triangle A, B and C represent the three angles, C being the right angle; and a, b, and c represent the opposite sides. Prove that $\cos 2A = \dfrac{b^2 - a^2}{b^2 + a^2}$. (Assume $\cos 2A = \cos^2 A - \sin^2 A$.)   4

7. If a and b represent two sides of a triangle and A and B their opposite angles respectively, prove that $\log b = \log a + \log \sin B - \log \sin A$.   3

8. A tower stands on a hill; at the base of the hill is a level plain. Show what measurements must be made and what computations are necessary to find the height of the tower without leaving the plain.   4

9. Find the area of an isosceles triangle in terms of its base and its vertical angle.   3

10. If the length of a degree of longitude at the equator is l, what is the length of a degree at a place whose latitude is $A°$?   3