

The University of the State of New York  
EXAMINATION FOR QUALIFYING CERTIFICATES

PLANE TRIGONOMETRY

Thursday, January 25, 1917—1.15 to 4.15 p. m., only

*Answer five questions. Papers entitled to less than 75 credits will not be accepted.*

1 Given  $B=52^{\circ} 45'$ ,  $C=60^{\circ} 30'$ ,  $a=125.3$  ft; find  $A$  correct to the nearest minute and  $b$  correct to the nearest tenth of a foot.

2 Given  $a=231.4$  ft,  $b=326.5$  ft,  $C=125^{\circ} 10'$ ; find  $c$  correct to the nearest tenth of a foot. Check.

3 Solve the equation  $\cos 2x = \cos x + \sin x$  for values of  $x$  between 0 and 360. Check.

4 Prove the identity  $\tan\left(45^{\circ} + \frac{A}{2}\right) = \frac{1 + \sin A}{\cos A}$

5 a The captain of a ship observed a lighthouse directly to the east; after sailing north 5 miles, he observed the lighthouse lying S.  $50^{\circ} 30'$  E. How far was the ship from the lighthouse at the time of the second observation?

b By the use of logarithms find the value of

$$\frac{(42.3)^2 \times 0.0135}{\sqrt[3]{136.7}}$$

6 A public park in the form of a triangle measures on its three sides 324.2 ft, 256.3 ft and 115.4 ft respectively; find the angle in which the streets intersect opposite the longest side of the park.

7 It is desired to find the height of the top of a flagpole  $F$  placed over the center of a large building.  $C$  is an inaccessible point directly below  $F$  and on the same level with  $A$  where the first observation is taken. At  $A$  the angle of elevation of  $F$  is found to be  $54^{\circ} 28'$ . From  $A$  a distance  $AB=300$  ft is measured along the sidewalk and the angle  $BAC$  is found to be  $42^{\circ} 50'$ . At  $B$  another observation shows the horizontal angle between  $A$  and  $F$  to be  $16^{\circ} 45'$ . Find  $FC$ , that is, the height of  $F$  above the level of  $A$ .