High School Department

174TH EXAMINATION

TRIGONOMETRY

Thursday, June 19, 1902—9.15 a. m. to 12.15 p. m., only

Answer eight questions but **no more.** *Include at least three from the third division if credit is desired for both plane and spheric trigonometry. If more than eight are answered only the first eight 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. In a right triangle C represents the right angle. Each complete answer will receive* 12½ *credits. Papers entitled to 75 or more credits will be accepted.*

Give special attention to arrangement of work.

First division

1 Without using the tables, derive the numeric value of *each* of the following: sin 45°, sin 30°, sin 15°.

2 Assuming the values of sin $(A+B)$ and cos $(A+B)$, prove that $\sin 4A = 4 \sin A \cos^3 A - 4 \cos A \sin^3 A$

3 Given $\tan A = \frac{3}{4}$ and $\sin A = -\frac{3}{5}$; write the values of *four* other functions of A. In which quadrant is A?

4 Given $\log 2 = 0.301030$, $\log \frac{1}{3} = \bar{1}.522879$; without using the tables, find to *six* decimal places the logarithms of 3, $\frac{1}{2}$, $\sqrt[3]{12}$, $\frac{80}{27}$, 36^4.

Second division

5–6 At a point A the angle of elevation of the top of a church spire is 30° 57′ 45″; from a point 50 feet directly above A the angle of elevation is 21° 48′. Find the vertical hight of the top of the spire above the level of A, and the horizontal distance of the spire from A.

7 The sides of a triangle are respectively 128 feet, 142 feet and 165 feet; find the smallest angle and the area of the triangle.

8 Assuming the radius of the earth to be 4000 miles, find the radius of the arctic circle and the distance of the center of this circle from the pole. [Latitude of the arctic circle is 66° 30′ north.]

Third division

9 Given $a = 50° 12'$, $b = 116° 44'$, $c = 129° 12'$; find A.

10–11 Given $A = 110°$, $B = 133° 30'$, $a = 147° 6'$; find b, c and C.

12 When the altitude of the sun east of the meridian is 32° 15′ and its declination is 18° 40′ north, find the apparent local time at Albany, latitude 42° 40′ north.