SOLID GEOMETRY

Monday, September 10, 1917—1.15 to 4.15 p. m., only

Answer eight questions, including four from group I and four from group II. Papers entitled to less than 75 credits will not be accepted.

Group I

Answer four questions from this group.

1 Mention *four* sets of conditions either of which determines the position of a plane.

2 Prove that if two angles, not in the same plane, have their sides respectively parallel and lying in the same direction, they are equal.

3 Prove that if two planes are perpendicular, a straight line drawn through any point of one plane perpendicular to the other will lie in the first plane.

4 Prove that the volume of any pyramid is equal to one third of the product of its base and its altitude.

5 Prove that every section of a convex cone made by a plane passing through its vertex is a triangle.

6 Prove that any side of a spheric triangle is less than the sum of the other two sides.

Group II

Answer four questions from this group.

7 If the edge of a cube is e, find in terms of e the volume of (a) the inscribed cylinder, (b) the inscribed sphere, (c) the inscribed cone.

8 A square pyramid 24 inches high has a base whose area is 400 square inches; find (a) its lateral surface, (b) the distance from the vertex to the section that is parallel to the base and has an area of 100 square inches.

9 Prove that if two lines are tangent to a sphere at the same point, their plane is tangent to the sphere.

10 Prove that the segments of two parallel lines included between parallel planes are equal.

11 Prove that the sum of the dihedral angles of a trihedral angle lies between two and six right angles.

12 A round stick of timber is 18 feet long, 30 inches in diameter at one end and 25 inches at the other end; how many cubic feet does it contain?