# University of the State of New York
## Examination Department
### 142D EXAMINATION
# SOLID GEOMETRY
### Friday, January 29, 1897 — 1:15 to 4:15 p. m., only

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*100 credits, necessary to pass, 75*

*Answer 10 questions but* **no more.** *If more than 10 questions are answered only the first 10 of these answers will be considered. Draw carefully and neatly each figure in construction or proof, using letters instead of numerals. Arrange work logically. Each complete answer will receive 10 credits.*

1 Define *diedral angle, plane angle of a diedral angle, prism, altitude, regular polyedron.*

2 Prove that a straight line perpendicular to each of two straight lines at their point of intersection is perpendicular to the plane of those lines.

3 Find the volume of a rectangular parallelopiped the dimensions of whose base are 14 feet and 9 feet and the area of whose entire surface is 620 square feet.

4 Find the lateral edge, lateral area and volume of a regular triangular pyramid each side of whose base is 12 feet and whose altitude is 15 feet.

5 Prove that if two straight lines are cut by three parallel planes, the corresponding segments are proportional.

6 If the volume of a cube is $4\frac{11}{27}$ cubic feet, what is the area of its entire surface in square inches?

7 Prove that the sections of a prism made by two parallel planes that cut all the lateral edges are equal polygons.

8 Prove that if a pyramid be cut by a plane parallel to its base, (*a*) the edges and the altitude are divided proportionally, (*b*) the section is a polygon similar to the base.

9 The altitude of a pyramid is 12 inches and its base is a square, 9 inches on each side; what is the area of a section parallel to the base, whose distance from the vertex is 8 inches?

10 Two bins of similar form contain respectively 375 and 648 bushels of wheat. If the first bin is 3 feet 9 inches wide, what is the width of the second?

11 Prove that two rectangular parallelopipeds having equal bases are to each other as their altitudes.

12 Prove that a triangular pyramid is equivalent to one third of a triangular prism having the same base and altitude.

13 Prove that the volume of a cylinder of revolution is equal to its lateral area multiplied by one half the radius of its base.

14 Find the area of the surface and the volume of a sphere inscribed in a cube the area of whose surface is 486 square inches.

15 A right triangle whose legs are *a* and *b* revolves about its hypotenuse as an axis. Find the area of the entire surface and the volume of the solid generated.