

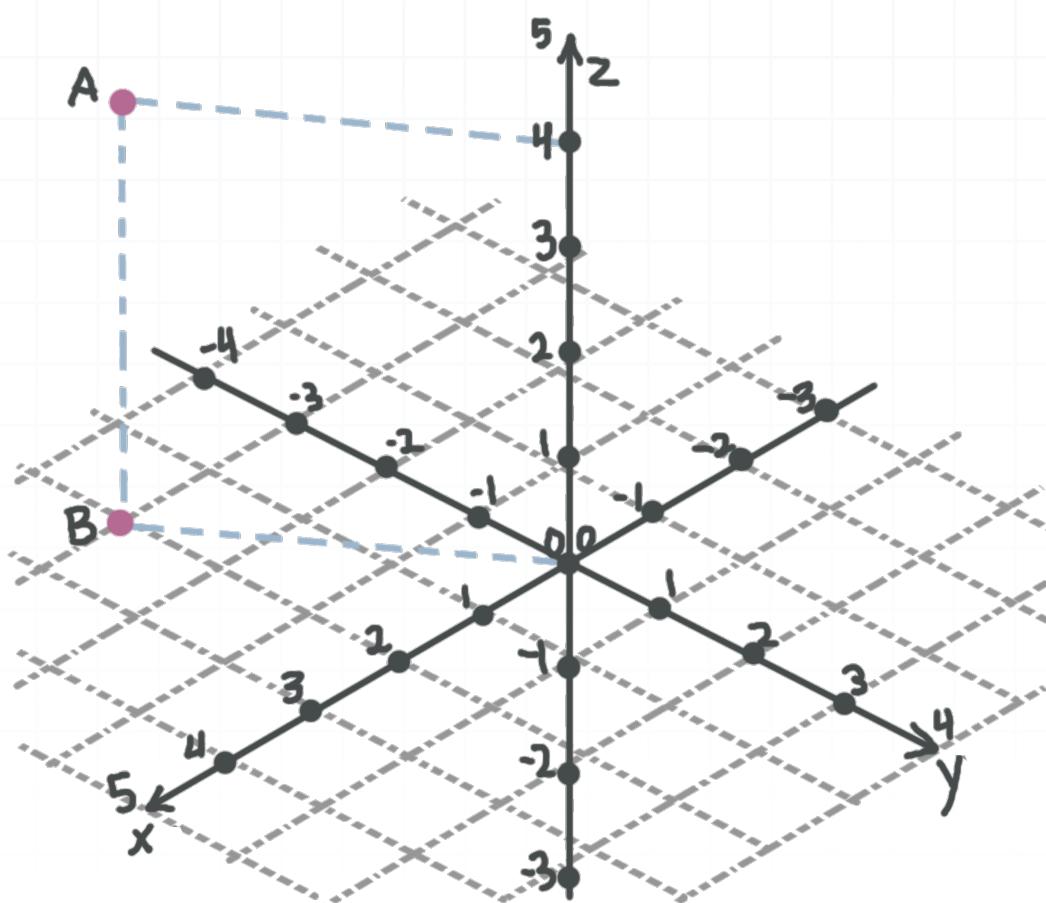


Calculus 3 Workbook

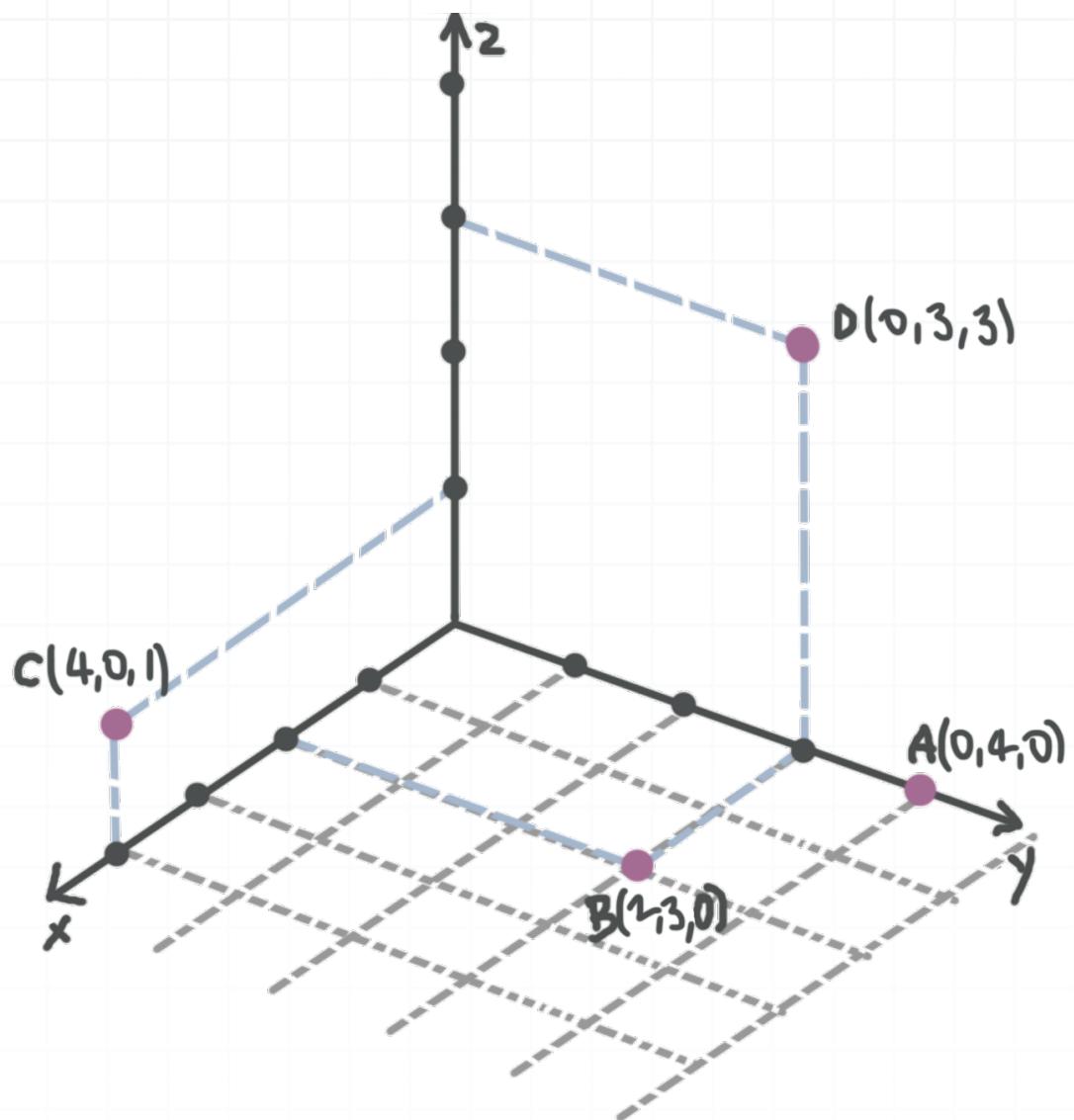
Three-dimensional coordinate systems

PLOTTING POINTS IN THREE DIMENSIONS

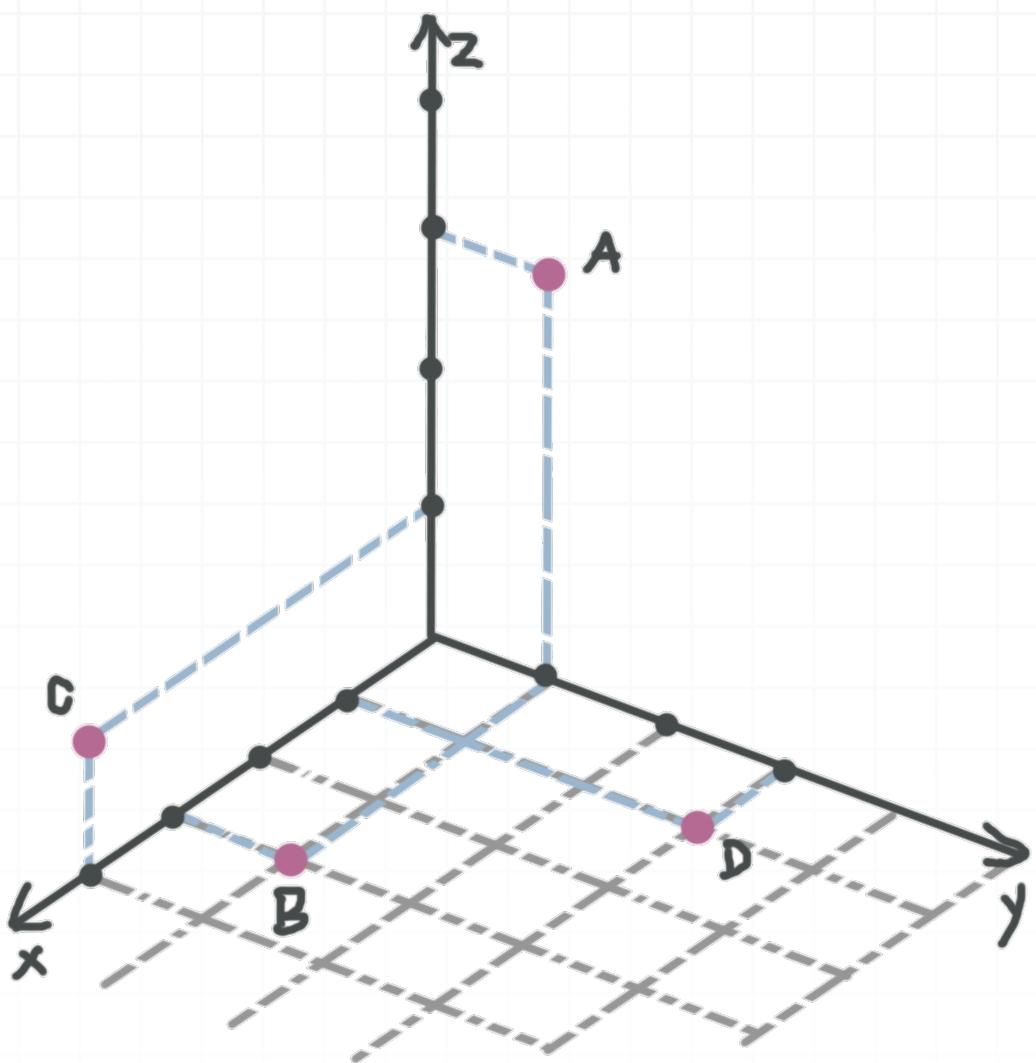
■ 1. What are the coordinates of point A?



■ 2. Which of the points A, B, C, and D lie on the xz -plane?



- 3. Which of the points A , B , C , and D has coordinates $(3,1,0)$?



DISTANCE BETWEEN POINTS IN THREE DIMENSIONS

- 1. Find the perimeter P of the triangle ABC given $A(1,0,0)$, $B(2,3,0)$, and $C(3,3, - 3)$.
- 2. Given $A(-1,0,0)$, $B(-2,0,2)$, and $C(0,1,0)$, find the measure of angle BAC in degrees using the law of cosines:

$$\cos(BAC) = \frac{AB^2 + AC^2 - BC^2}{2 \cdot AB \cdot AC}$$

- 3. Find the point on the x -axis that's equidistant from $A(-1,1,0)$ and $B(-2,1, - 1)$.



CENTER, RADIUS, AND EQUATION OF THE SPHERE

■ 1. Find the equation of a sphere with center $(1,3, - 2)$ and y -intercept 1.

■ 2. Of the points $A(-4, - 1,7)$, $B(-5,1,5)$, $C(-6, - 6,5)$, and $D(-7,0,3)$, which one does not lie in the interior of the sphere?

$$(x + 5)^2 + (y + 3)^2 + (z - 4)^2 = 16$$

■ 3. The endpoints of the diameter of a sphere are $A(2,4, - 3)$ and $B(6,0, - 1)$. Find the equation of this sphere.

DESCRIBING A REGION IN THREE DIMENSIONAL SPACE

- 1. Describe the surface in three-dimensional space.

$$x^2 + 2x + z^2 = 0$$

- 2. Describe the surface in three-dimensional space.

$$z = 7$$

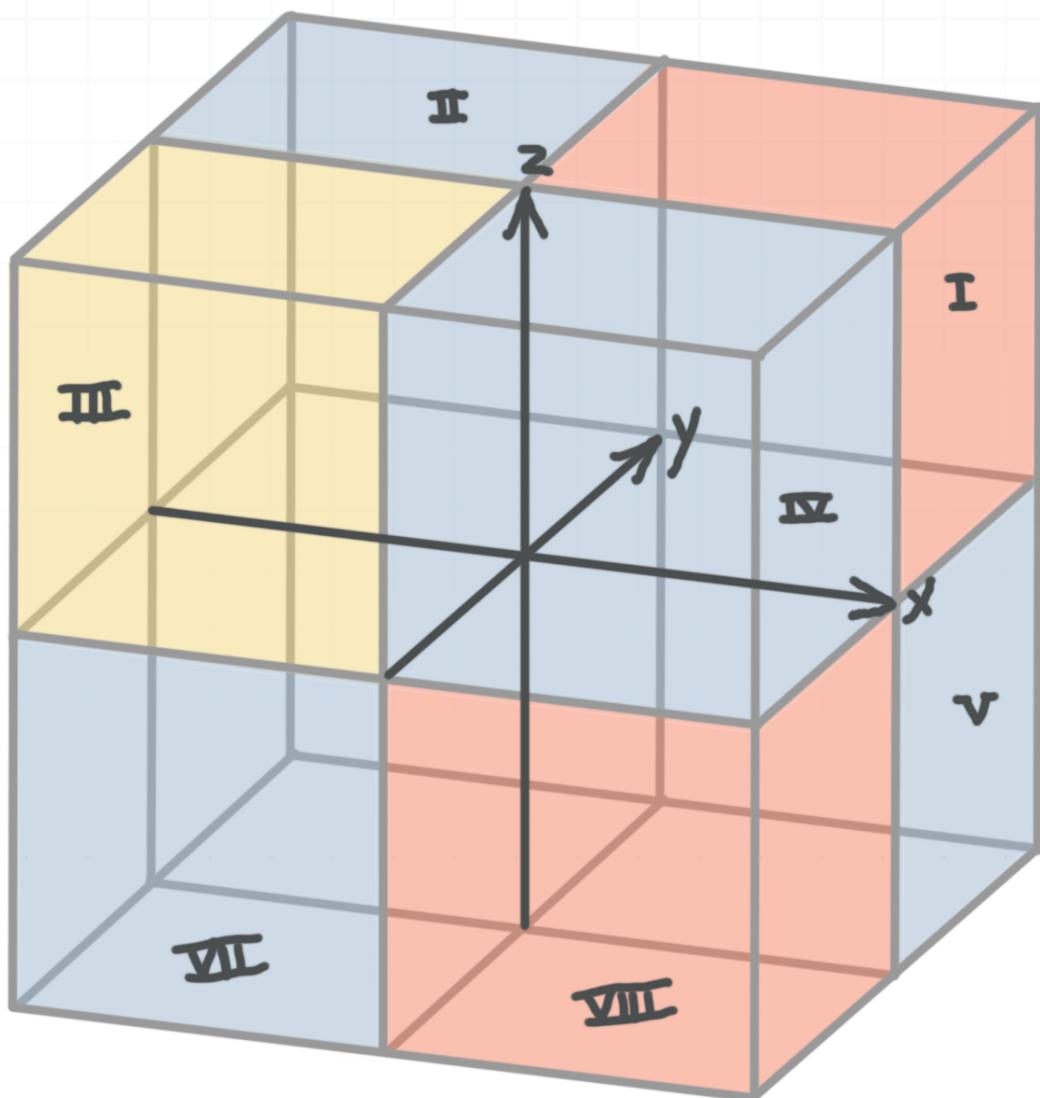
- 3. Describe the surface in three-dimensional space.

$$xy = 0$$

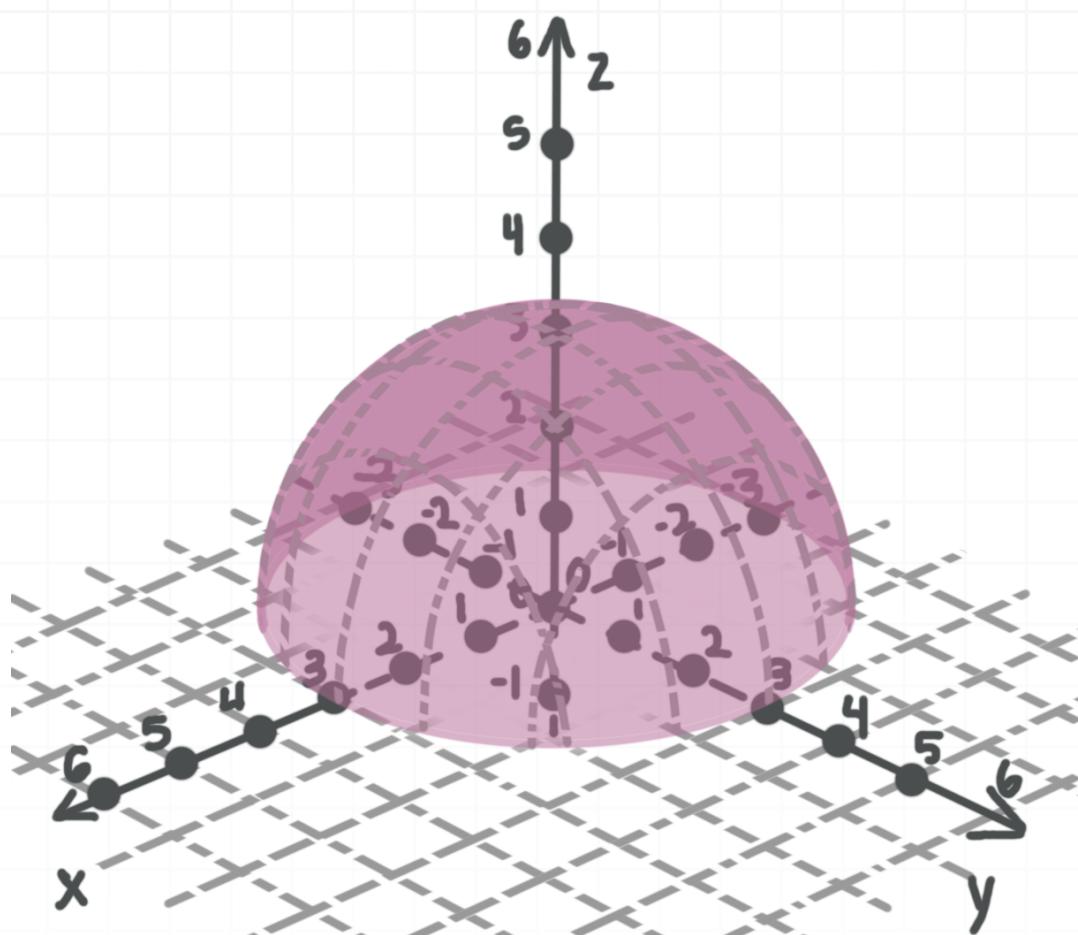


USING INEQUALITIES TO DESCRIBE THE REGION

- 1. What set of inequalities describes Octant III? Remember that an “octant” is one of the eight spaces that make up the three-dimensional coordinate system.



- 2. What set of inequalities describes the region consisting of all points inside the hemisphere, if the base of the sphere is centered at $(0,0,0)$?



- 3. What set of inequalities describes the region consisting of all points which lie at most 5 units from the yz -plane?

