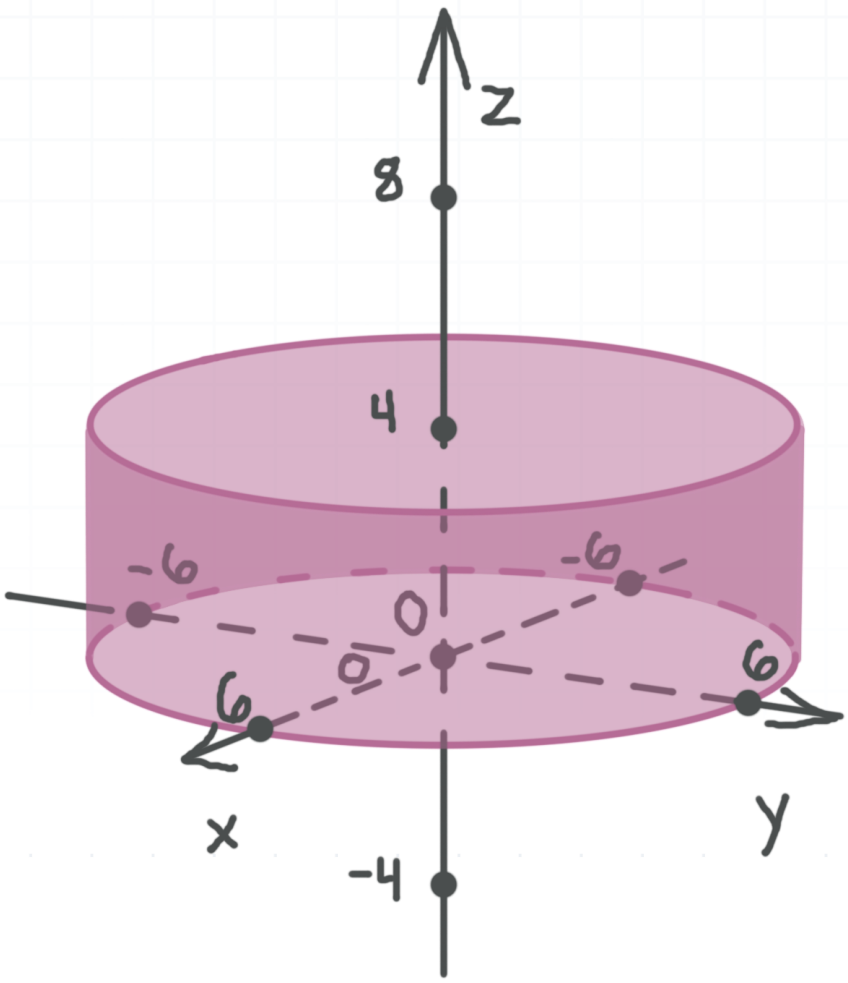
Calculus 3 Workbook

Applications of triple integrals

krista king MATH

TRIPLE INTEGRALS TO FIND MASS AND CENTER OF MASS

■ 1. The disk with radius 6 and height 4 has density $\delta = 1/(d+2)$, where d is the distance to the central axis of the disk. Find the mass and center of mass of the disk.



■ 2. The rectangular plate with base dimensions 4×5 m and height 2 m has density $\delta = 4d$ kg/m^2, where d is the distance from its 4×2 m left face. Find the mass and center of mass of the plate.

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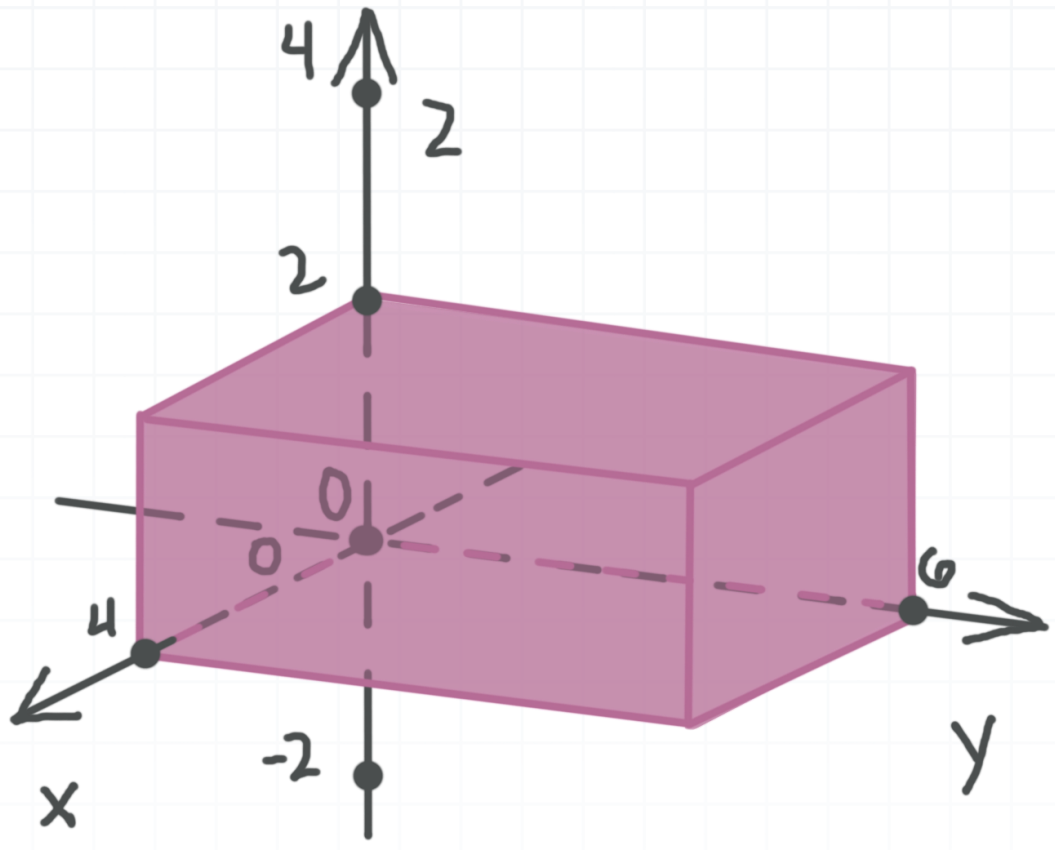
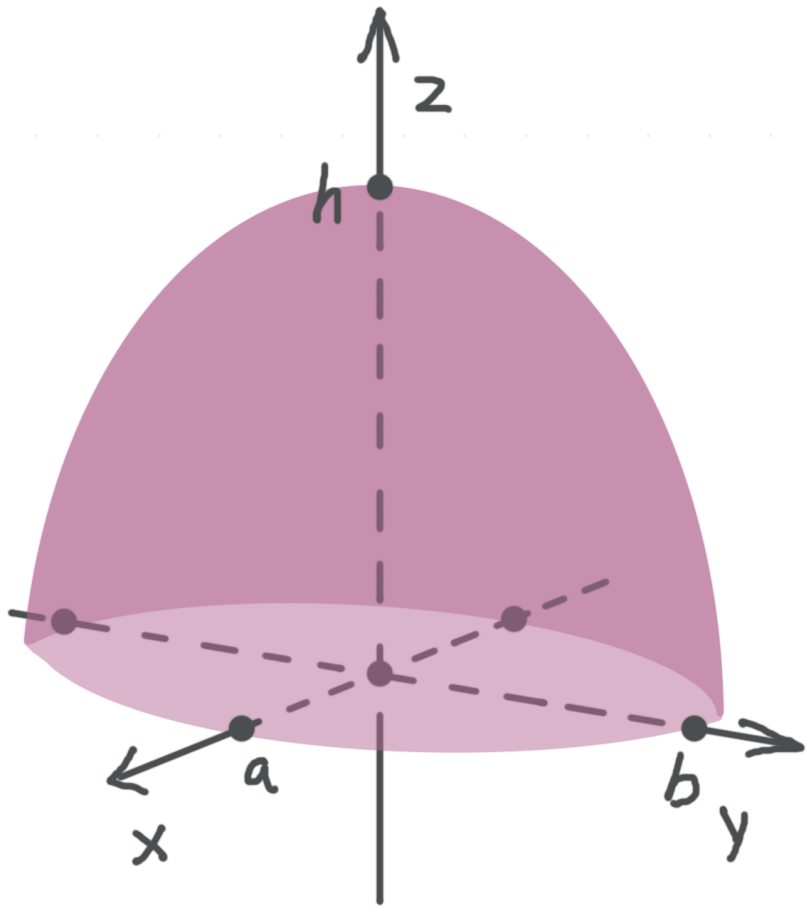


3. The half ellipsoid has a base with semi-axes a and b, height h, and constant density δ. Find its mass and center of mass.



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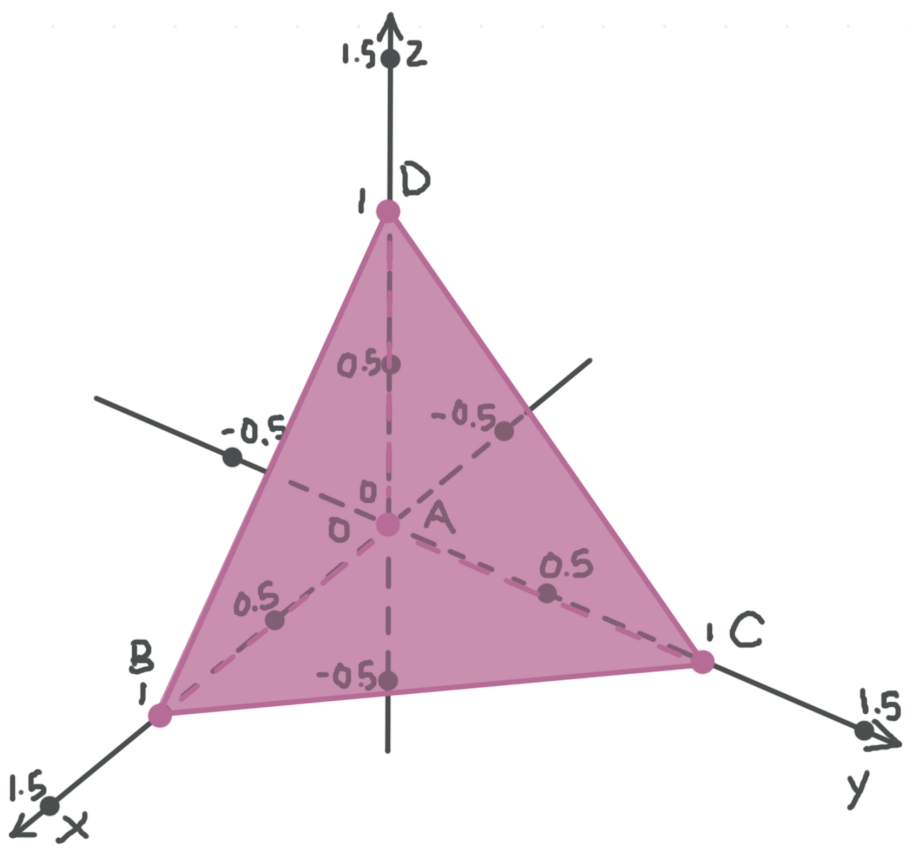
MOMENTS OF INERTIA

■ 1. The spherical solid object with radius 5 has density $\delta = d^2$, where d is the distance to the center of the sphere. Find the moment of inertia of the object about any line that passes through its center.

■ 2. A box (rectangular cuboid) has length 6, width 4, height 2, and constant density δ. Find the moment of inertia of the box about all of its edges.

■ 3. The tetrahedron $ABCD$ has constant density δ. Find the moment of inertia of the solid about the line AB, where $A(0,0,0)$, $B(1,0,0)$, $C(0,1,0)$, and $D(0,0,1)$.



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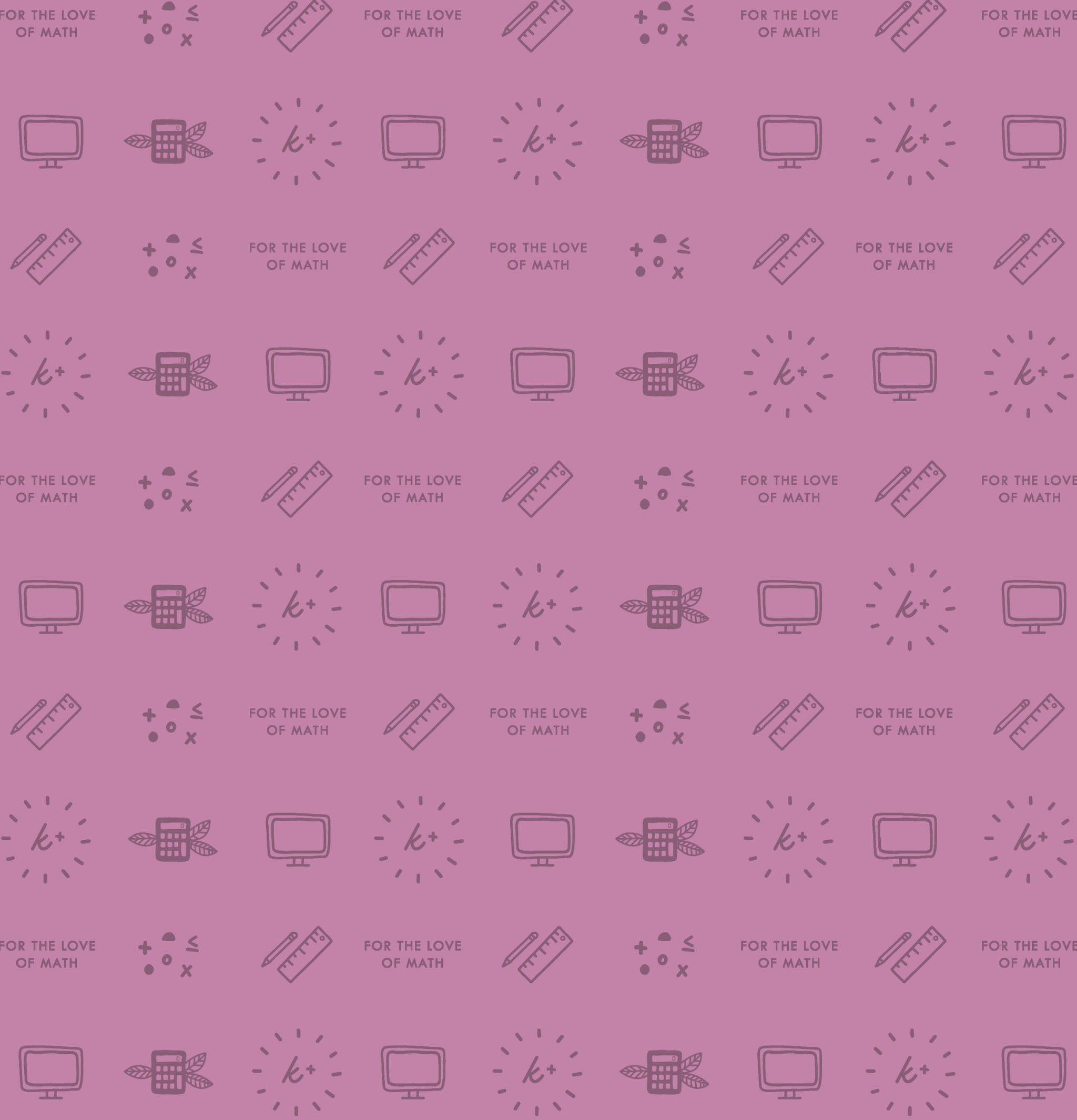

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