Assignment No. 6

Physics 2P20

Due December 4, 2023

1. Find the center of mass of each of the following:
   (a) a thin wire bent into the form of a three-sided, block-shaped "⊔" with each segment of equal length b;
   (b) a quadrant of a uniform circular lamina of radius b;
   (c) the area bounded by parabola $y = x^2/b$ and the line $y = b$;
   (d) the volume bounded by paraboloid of revolution $z = (x^2 + y^2)/b$ and the plane $z = b$;
   (e) a solid uniform right circular cone (the peak is directly above the center of the circular base) of height b (note that the radius of the base is, indeed, not specified).
2. A solid uniform sphere of radius a has a spherical cavity of radius $a/2$ centered at a point $a/2$ from the center of the sphere. Find the center of mass.
3. *Kleppner and Kolenkow, 2nd edition*, Problem 7.8.
   Find the moment of inertia of a uniform sphere of mass M and radius R around an axis through the center.
4. *Kleppner and Kolenkow, 2nd edition*, Problem 7.16.
5. *Kleppner and Kolenkow, 2nd edition*, Problem 7.27.
6. *Kleppner and Kolenkow, 2nd edition*, Problem 7.34.
7. *Kleppner and Kolenkow, 2nd edition*, Problem 7.38.