1.) Consider the tetrahedron $R$ with vertices $(2, 0, 3)$, $(0, 0, 3)$, $(0, 4, 0)$, and $(0, 4, 3)$.
   a.) Sketch $R$ in three dimensional space.
   b.) Describe $R$ using rectangular coordinates by first projecting $R$ onto
      i.) the $xy$-plane.
      ii.) the $yz$-plane.
      iii.) the $xz$-plane.
   c.) SET UP but DO NOT EVALUATE a double integral which represents the volume of $R$.
   d.) SET UP but DO NOT EVALUATE a triple integral which represents the volume of $R$.

2.) Evaluate $\int_{0}^{\pi/2} \int_{0}^{z} \int_{0}^{y} \cos(x + y + z) \, dx \, dy \, dz$.

3.) Evaluate the following integrals by first converting to polar (cylindrical) coordinates.
   a.) $\int_{1/\sqrt{2}}^{1} \int_{\sqrt{1-x^2}}^{x} \frac{1}{\sqrt{x^2 + y^2}} \, dy \, dx$
   b.) $\int_{0}^{\pi/2} \int_{\sqrt{3x}}^{\sqrt{9-x^2}} \int_{0}^{2} \sqrt{x^2 + y^2} \, dz \, dy \, dx$

4.) Sketch the solid in three dimensional space whose volume is given by the following integral.
   a.) $\int_{\pi/4}^{\pi/2} \int_{0}^{\csc \theta} (5r - r^2 \cos \theta - r^2 \sin \theta) \, dr \, d\theta$
   b.) $\int_{1}^{\sqrt{2-x^2}} \int_{-\sqrt{2-x^2-y^2}}^{2-x^2-y^2} 1 \, dz \, dy \, dx$

5.) Consider the rectangular box in three dimensional space bounded by the planes $x = 0$, $x = 4$, $y = 0$, $y = 3$, $z = 0$, and $z = 5$. Assume that the density at the point $P = (x, y, z)$ is numerically equal to 7 plus the distance from $P$ to the point $(3, 4, 5)$. SET UP but DO NOT EVALUATE a triple integral which represents the moment of inertia of this solid about
   a.) the origin.
   b.) the $z$-axis.

6.) The center of mass of a solid $R$ of mass $M$ is located at $(0, 0, 0)$. Its moment of inertia about the $x$-axis is $I$.
   a.) Find the moment of inertia for $R$ about a line parallel to the $x$-axis and $k$ units from the $x$-axis.
   b.) About which such line parallel to the $x$-axis is the moment of inertia the least?