Math 21B
Vogler
Worksheet 6

1.) Consider a large flat square plate 10 feet by 10 feet submerged in a pool of virgin olive oil (weighing 58 $lbs./ft.^3$ 20 feet deep. Compute the force of olive oil pressure on the plate if the plate

a.) lies flat on the bottom of the pool.
b.) sits vertically on one edge at the bottom of the pool.
c.) sits with one edge on the bottom of the pool and is tilted at 45 degrees.
d.) sits with one edge on the bottom of the pool and is tilted at 30 degrees from vertical.

2.) A thin rod lies on the x-axis from $x = 0$ to $x = 20$ centimeters. Assume that the density of the rod x centimeters from its left end is $\delta(x) = \sqrt{x+1}$ grams per centimeter.

a.) Determine the rod's total mass.
b.) Determine the rod's center of mass.

3.) A thin plate lies in the region bounded by the graphs of $y = x^2$, $x = 2$, and $y = 0$. Assume that the density at point (x, y) of the plate is $\delta(x, y) = 10$ ounces per square inch.

a.) Determine the plate's total mass.
b.) Determine the plate's center of mass.

4.) A thin plate lies in the region bounded by the graphs of $y = e^x$, $y = 1$, and $x = \ln 2$. Assume that the density at point (x, y) of the plate is $\delta(x, y) = x^2 + 1$ ounces per square inch.

a.) Determine the plate's total mass.
b.) Determine the plate's center of mass.

5.) Find the centroid of the region bounded by the graphs of $y = x^4$ and $y = x^5$.

6.) Find the centroid (Set up but do not evaluate integrals.) of the region bounded by the graphs of $y = x^2$ and $y = x^2(x - 3)$.

THE FOLLOWING PROBLEM IS FOR RECREATIONAL PURPOSES ONLY.

7.) You have 8 black socks, 12 blue socks, 10 gray socks, and 5 white socks randomly scattered in your bureau drawer. If you reach into the drawer without looking, how many socks must you take out to be sure of having a matching pair of socks ?

Thanks to Dr. Kouba