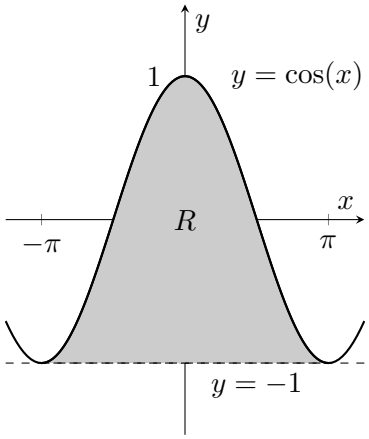
5. [15 points] Consider the region R in the $xy-$plane bounded between $y = \cos(x)$ and $y = -1$ for x values between $-\pi$ and π. A sketch of the region is shown below.



a. [5 points] Find an expression involving one or more integrals for the volume of the solid formed by rotating the region R around the line $x = 5$. Do not evaluate your integral(s).

b. [5 points] Find an expression involving one or more integrals for the volume of the solid formed by rotating the region R around the line $y = -3$. Do not evaluate your integral(s).

c. [5 points] Find an expression involving one or more integrals for the volume of the solid with a base in the shape of the region R, and semicircular cross sections perpendicular to the x-axis. Do not evaluate your integral(s).