Double Integrals 2

1. Consider the region $\mathcal{R} = [0, 1] \times [-1, 1]$. Find the volume of the solid whose height is $f(x, y) = 4y^3 x + 2y$ over this region.

2. Consider the trapezoidal region $\mathcal{T}$ that has vertices $(0, 0), (0, 1), (2, 1),$ and $(4, 0)$. Draw this region and compute the integral of $g(x, y) = 2(x + y)$ over $\mathcal{T}$.

3. Consider the region $\mathcal{R}$ enclosed by $y = (x - 1)^2 - 1$ and $y = -(x + 1)^2 + 1$. Integrate $f(x, y) = 4x$ over this region. 
   **Hint:** You will have to find the $x$-bounds yourself by looking at where these curves intersect.