8. [10 points] Consider the region A in the xy-plane bounded by $y = 1 - x^4$, the y-axis, and the x-axis in the first quadrant. The area of A is $\frac{4}{5}$.

a. [5 points] Suppose N is any positive whole number. Put the following quantities in order from least to greatest. MID(N), TRAP(N), RIGHT(N), LEFT(N), and the number $\frac{4}{5}$, where all of the approximations listed are for the integral $\int_0^1 (1 - x^4)\, dx$.

Solution:

RIGHT(N) $\leq$ **TRAP**(N) $\leq$ 4/5 $\leq$ **MID**(N) $\leq$ **LEFT**(N)

b. [5 points] Write an expression involving integrals that gives the volume of the solid formed by rotating the region A around the y-axis.

Solution: The volume of the solid formed by rotating the region A about the y-axis is $\int_0^1 2\pi x(1 - x^4)dx$ or equivalently $\int_0^1 \pi(1 - y)^{\frac{1}{2}} dy$