[Section 6.3] Volumes by cylindrical shells

28. Midpoint rule:

    $\int_a^b xf(x)\ dx \approx \sum x_i f(\overline{x}_i)\Delta x$, where $\Delta x = \frac{b-a}{n}$ and $\overline{x}_i = \frac{1}{2}(\overline{x}_{i-1} + \overline{x}_i)$, $i = 1, 2, ..., n$

46. By symmetry, the volume of a napkin ring obtained by drilling a hole of radius r through a sphere with radius R is twice the volume obtained by rotating the area above the x-axis and below the curve $y = \sqrt{R^2 - x^2}$ (the equation of the top half of the cross-section of the sphere),between $x = r$ and $x = R$,about the y-axis.