

2007 AB1/BC1

A. Vertical Slices:

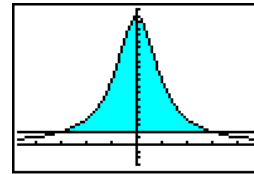
$$\text{Area of R} = \int_{-3}^3 \left(\frac{20}{1+x^2} - 2 \right) dx$$

$$= 37.961 \text{ or } 37.962$$

Horizontal Slices:

$$\text{Area} = \int_{\frac{1}{2}}^{20} \left(2\sqrt{\left(\frac{20}{y} - 1\right)} \right) dy$$

$$= 37.961 \text{ or } 37.962$$



B. Vertical Slice or Disk:

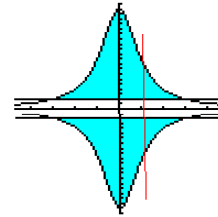
$$\text{Volume} = \int_{-3}^3 \left(\pi \left(\frac{20}{1+x^2} \right)^2 - \pi 2^2 \right) dx$$

$$= 1871.190 \text{ or } 595.618\pi$$

Shells:

$$\text{Volume} = \int_{\frac{1}{2}}^{20} 2\pi y \left(2\sqrt{\frac{20}{y} - 1} \right) dy$$

$$= 1871.190 \text{ or } 595.618\pi$$

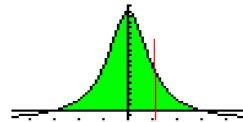


Reflected
region
for part B

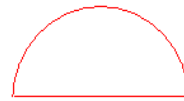
C.

$$\int_{-3}^3 \left(\frac{1}{2} \pi \left(\frac{\left(\frac{20}{1+x^2} - 2 \right)^2}{2} \right) \right) dx$$

$$= 174.268 \text{ or } 55.471\pi$$



Base of
semicircles in
part C



Representative
slice in part C.
Diameter is
the difference
of the two
functions.