AP Calculus BC
Lesson 6.5 Average Value

Remember that the average value of a function $f(x)$ on the interval [a, b] is given by $\frac{\int_a^b f(x)dx}{b-a}$

1. a. Find the average value of the function $f(x)=\sqrt{x}$ on the interval from $x = 4$ to $x = 9$.

   b. Find a value c such that $4 \le c \le 9$ and $f(c)$ is equal to the average value of the function found in part a.

2. Find the average value of the slope of $f(x)=x^2+3x+2$ on the interval from $x = 0$ to $x = 3$.

3. (1980BC6,modified) Let R be the region enclosed by the graphs of $y = e^{-x}$, $x = k$ ($k > 0$), and the coordinate axes.

   (a) Find the volume, in terms of k, of the solid generated if R is rotated about the y-axis.

   (b) Find the volume, in terms of k, of the solid whose base is R and whose cross sections perpendicular to the x-axis are squares.

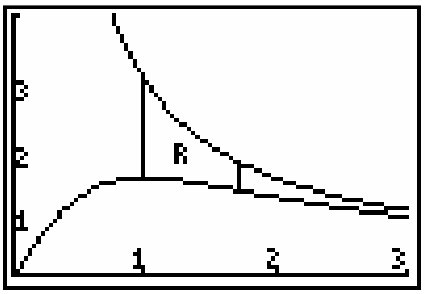
4. Let R be the region enclosed by the graphs of $y = e^{-x}$, $y = e^{x}$, and $x = \ln(4)$.

   (a) Find the area of R.

   (b) Find the volume of the solid generated when the region R is revolved about the x-axis.

   (c) Find the volume of the solid generated when the region R is revolved about the y-axis.

5. (1988BC2) Let R be the region between the graphs of $y = \frac{3}{x}$ and $y = \frac{3x}{x^2+1}$ from $x = 1$ to $x = \sqrt{3}$, as shown in the figure at right.



$0 \le x \le 3,\ 0 \le y \le 3$

   (a) Find the area of R.

   (b) Find the volume of the solid generated by revolving R about the y-axis.