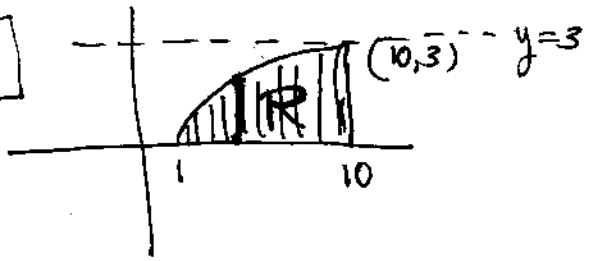
Volume and Area AP Problems **Name:** Answers
AP Calculus

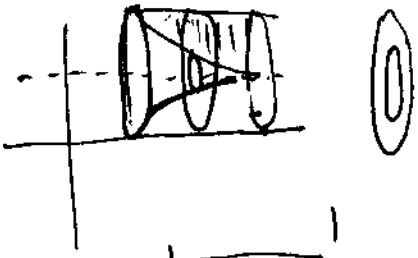
Calculator problems. Since you are using your calculators for these problems, you do not need to take any integrals by hand, but you must clearly show the integral(s) and the set up for each problem.

1) Let R be the region enclosed by the graph of $y = \sqrt{x-1}$, the vertical line $x = 10$, and the x-axis.
   (a) Find the area of R.
   (b) Find the volume of the solid generated when R is revolved about the horizontal line $y = 3$.
   (c) Find the volume of the solid generated when R is revolved about the vertical line $x = 10$.

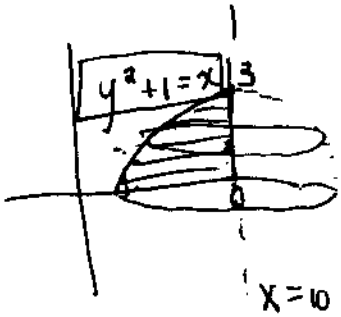
a) $\text{Area} = \int_1^{10} \sqrt{x-1}\, dx = \boxed{18}$



b) $V = \pi \int_1^{10} \left((3)^2 - (3-\sqrt{x-1})^2\right) dx = \boxed{212.058}$



c) $V = \pi \int_0^3 \left(10 - (y^2+1)\right)^2 dy$



$= \boxed{407.150}$

Volume + Area AP Problems

2005 #1

calc.

2) a) Area of $R = \int_0^{.17821805\ldots} \left(g(x) - f(x)\right) dx$

$\frac{1}{4} + \sin(\pi x) = 4^{-x}$

use calc

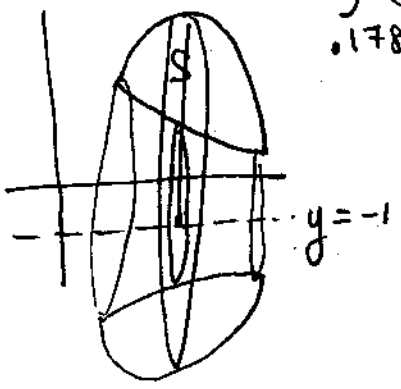
$x = .17821805$

a) Area of R = .065

b) Area of $S = \int_{.17821}^{1} \left(f(x) - g(x)\right) dx$ = .410

c) Volume $= \pi \int_{.17821}^{1} \left(\left(f(x)+1\right)^2 - \left(g(x)+1\right)^2 \right) dx$

$= \pi \int_{.17821}^{1} \left(\left(\frac{1}{4} + \sin \pi x\right)^2 - \left(4^{-x}+1\right)^2 \right) dx$



= 4.559