

MA114 Summer II 2017
Worksheet – Average Value and Volumes I
7/10/17

1. Find the average value of the following functions over the given interval.

a) $f(x) = x^3, [0, 4]$

c) $f(x) = e^{-nx}, [-1, 1]$

b) $f(x) = x^3, [-1, 1]$

d) $f(x) = \frac{1}{1+x^2}, [-1, 1]$

2. Calculate the volume of the following solid. The base is a square, one of whose sides is the interval $[0, l]$ along the x -axis. The cross sections perpendicular to the x -axis are rectangles of height $f(x) = x^2$.

3. For each of the following, use disks/washers to find an integral expression for the volume of the solid of revolution generated by rotating the region R about the given axis. Evaluate integrals a) and d).

a) R is the region bounded by $y = 1 - x^2$ and $y = 0$; about the x -axis.

and $y = 0$; about the line $y = -1$

b) R is the region bounded by $y = \frac{1}{x}$, $x = 1$, $x = 2$, and $y = 0$; about the x -axis.

e) Between the regions in part (a) and part (d), which volume is bigger? Why?

c) R is the region bounded by $x = 2\sqrt{y}$, $x = 0$, and $y = 9$; about the y -axis.

f) R is the region bounded by $y = e^{-x}$, $y = 1$, and $x = 2$; about the line $y = 2$.

d) R is the region bounded by $y = 1 - x^2$

g) R is the region bounded by $y = x$, $y = \sqrt{x}$; about the line $x = 2$.