

# Weekly Assignment 1

## 1. Average value

The average of a discrete number of values  $x_1, x_2, \dots, x_n$  is  $\frac{1}{n} \sum_{k=1}^n x_k$ . The average of a continuous range of values,  $f(x)$ ,  $a \leq x \leq b$ , is  $\frac{1}{b-a} \int_a^b f(x) dx$ . Use this second fact to work the following.

Find the average value of

a,  $\blacksquare f(x) = e^{x/2}, 0 \leq x \leq 2$

b,  $\blacksquare$  Graph the above function and use it to estimate the  $x$ -value for which  $f(x) =$  its average value.

## 2. Volume

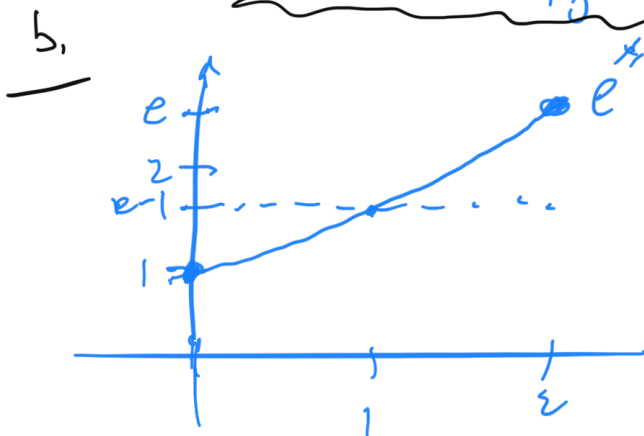
Find the volume of the solid of revolution obtained by rotating the region bounded by  $y = \frac{e^x + e^{-x}}{2}$  and the  $x$ -axis for  $-1 \leq x \leq 1$ , rotated about the  $x$ -axis.

- Sketch the planar region before rotating.
- Set up the integral(s) you use for this volume.
- Evaluate the integral(s) and find the volume.

#1. a. Average Value of  $f(x) = e^{x/2}$  on  $0 \leq x \leq 2$ .

$$\bar{f} = \frac{1}{b-a} \int_a^b f(x) dx = \frac{1}{2-0} \int_0^2 e^{x/2} dx = \frac{1}{2} \left[ 2e^{x/2} \right]_0^2$$

$$= e^{x/2} \Big|_0^2 = e - 1 \approx 1.7$$



$$f(1) \approx \bar{f}$$

$$f(1) = e^{1/2} \approx \sqrt{2.72}$$

$$\approx 1.7$$

pretty close!

$$\begin{array}{r} 1.7 \\ \cdot 1.7 \\ \hline 119 \\ 170 \\ \hline 289 \end{array}$$