Math 145A
Winter 2017

UPDATED GENERAL INFORMATION — JANUARY 19, 2017

Assignments for Chapters $2-4$

Working the exercises listed below is **strongly recommended.**

The following exercises are taken from Sutherland:

- Chapter 2: 2.1 – 2.4
- Chapter 3: 3.1, 3.3 – 3.6
- Chapter 4: 4.1 – 4.2, 4.8

The following references are to the file file `exercises01w14.pdf` in the course directory.

- Additional exercise for Chapter 3: 1
- Additional exercises for Chapter 4: 1 – 2

Reading assignments from solutions to exercises

Another strong recommendation is to read through the solution to Exercise 4.12 from Sutherland (see the file `solutions01w14.pdf` in the course directory).

The first quiz

The first quiz on January 24 will cover material from Chapters 2–4 and the associated online material. It will involve understanding how some basic definitions apply to simple examples. Here are some possibilities:

1. Find the least upper bound for the sequence of numbers .09, .0909, .090909, ...

Answer. The least upper bound is the sum of the geometric series

$$\sum_{1}^{\infty} \frac{9}{100^k} \quad = \quad 9 \cdot \frac{1/100}{1-(1/100)} \quad = \quad \frac{9/100}{99/100}$$

which simplifies to 1/11.■

2. If $f(x) = x^2 + x$, find the inverse image $f^{-1}[\{1\}]$.

Answer. This is just the set of solutions to $f(x) = 1$ or equivalently $x^2 + x - 1 = 0$. The Quadratic Formula shows that the solutions are given by $\{\ \frac{-1}{2}(1+\sqrt{5}),\ \frac{-1}{2}(1-\sqrt{5})\ \}$.■

3. If $f(x) = x - x^2$, find the image $f[I]$, where I denotes the closed interval $[0, 1]$.

Answer. This is just the set of values $f(x)$ for $x \in I$. We know that the function takes a maximum value, a minimum value, and all values inbetween, so the problem basically amounts to finding the maximum and minimum values of f on the closed interval I. We do this by (a) computing the values at the endpoints, (b) finding the values of f and points where $f'(x) = 0$. At the endpoints the function's value is 0 in both cases. Also, $f'(x) = 0$ implies $x = \frac{1}{2}$, and we have $f(\frac{1}{2}) = \frac{1}{4}$. Thus the maximum and minimum values lie in the set $\{0, \frac{1}{4}\}$, and this means the image is the closed interval whose endpoints are the largest and smallest value. In this case we obtain the interval $[0, \frac{1}{4}]$.■