SOLUTIONS

Chapter 2
Extrinsic Curves

**Problem 2.1. Give Examples of F.O.V.’s**

a.

The following are a few of the examples that have been brought up in a class:

1. Consider successively a globe of the world, a map of the whole USA, a map of New York State, a map of the Ithaca Area, a map of the Cornell campus, a floor plan of White Hall, my ordinary experience of my office, ... Going from one level to the next the field of view shrinks but more details are discernible. Ithaca is indistinguishable from a point in the f.o.v. of New York State.

2. Wild flowers at a distance are a blur of color but up close you see individual petals.

3. When reading a book, one f.o.v. is the Table of Contents which differs from the f.o.v. of reading the text on an individual page.

4. “You can’t see the forest for the trees.”

5. A student may view her/his studies from several f.o.v.’s: As part of a career, The degree program, A particular course, What is studied in class one day. This was caused by the fact that the printer could distinguish 1/300 inches from 0 inches whereas to the word processor 1/300 inches = 0.00 inches.

7. One can ask: Is there reality independent of a field of view? See, for example, Eaves & Eaves, *Powers of Ten*, which is both a video and a book (Freeman and Sons). I can also remember a children’s book which I have now lost entitled *A View From the Oak*. In that book it was described how the different creatures that lived in and around an oak tree had very differing realities because they viewed the world within different f.o.v.’s.

b.

You can easily see that in any ordinary (linear) f.o.v. you are not able to distinguish $0$, $1$, and the national debt. The only f.o.v. that seems to work is a logarithmic f.o.v. in which $S_N$ is represented by $\log(N+1)$. The decibel scale (for sound) and the Richter scale (for earthquakes) are examples of logarithmic f.o.v.’s.

There is no f.o.v. in which [the national debt] is distinguishable from [the national debt]+$1, because the national debt is not that precisely defined. See also Part e, below.

The situation with a truck load of sand is the same as with the national debt.

Compare the fact that [the national debt] is indistinguishable from [the national debt]+$1 and that [truck load of sand] is indistinguishable from [truck load of sand]+[grain of sand] with the usual mathematical definition:

*A set X is infinite if it is in one-to-one correspondence with a proper subset of itself.*

c.

No, \{1.4, 1.49, 1.499, 1.4999, 1.49999, ...\} converges to 1.5, but [1.49...9]=1 and [1.5]=2.