

## Chapter 1 outline:

- ▶ Introduction, sets and elements (last week Wednesday)
- ▶ Set operations; visual verification of set propositions (last week Friday)
- ▶ Introduction to SML; cardinality and Cartesian products (Monday)
- ▶ Making types in SML (**Today**)
- ▶ Making functions in SML (Friday)

## Today: *Making stuff in SML*

- ▶ A few follow-up points from last time
- ▶ Making our own types
- ▶ Making our own operations (time permitting)

**1.8.1** What is the cardinality of  $\{0, 1, 2, \dots, n\}$ ?

**1.8.3** One might be tempted to think  $|A \cup B| = |A| + |B|$ , but this is not true in general. Why not? (Assume  $A$  and  $B$  are finite.)

**1.8.6** Describe three distinct partitions of the set  $\mathbb{Z}$ .

**1.9.5** Based on our description of the real number plane as a Cartesian product, explain how a line can be interpreted as a set.

**1.9.6** Explain how  $\mathbb{C}$ , the set of complex numbers, can be thought of as a Cartesian product.

**1.9.7** Any rational number (an element of set  $\mathbb{Q}$ ) has two integers as components. Why not rewrite fractions as ordered pairs (for example,  $\frac{1}{2}$  as  $(1, 2)$  and  $\frac{3}{4}$  as  $(3, 4)$ ) and claim that  $\mathbb{Q}$  can be thought of as  $\mathbb{Z} \times \mathbb{Z}$ ? Explain why these two sets *cannot* be thought of as two different ways to write the same set. (There are at least two reasons.)

```
#1(5, 4) + int(4.0 / 3.1)
```

```
(5 + 7, String.sub("hello", 2))
```

$$\begin{array}{c}
 (( (\underbrace{1}_{\text{int}}, \underbrace{2}_{\text{int}}), \underbrace{5.7}_{\text{real}}, (\underbrace{\# "A"}_{\text{char}}, \underbrace{\# "x"}_{\text{char}})), \underbrace{8}_{\text{int}}, \underbrace{"bye"}_{\text{string}}) \\
 \underbrace{\hspace{1.5cm}}_{\text{int} * \text{int}} \quad \underbrace{\hspace{2.5cm}}_{\text{char} * \text{char}} \\
 \underbrace{\hspace{4.5cm}}_{(\text{int} * \text{int}) * \text{real} * (\text{char} * \text{char})} \\
 \underbrace{\hspace{6.5cm}}_{((\text{int} * \text{int}) * \text{real} * (\text{char} * \text{char})) * \text{int} * \text{string}}
 \end{array}$$

**For next time:**

*Pg 36: 1.9.(3, 4, 8, 9, 10, 14, 16)*

*Pg 40: 1.10.(1-4)*

*SML problems should still be submitted on paper with the rest of the assignment.*

*Re-read 1.11 (if necessary)*

*Read 1.(12 & 13).*

*(No quiz)*