Chapter 2

A moment’s thought 2.2 Try reading out the formula in English, replacing the quantifiers by ‘for all’ and ‘there exists’. Remember that $y + y = 2y$.

A moment’s thought 2.5 What do we call an integer $n$ with no divisors except $n$ and 1?

A moment’s thought 2.2 Try reading out the formula in English, replacing the quantifiers by ‘for all’ and ‘there exists’. Remember that $x + x = 2x$.

A moment’s thought 2.8 Try some examples. A good start is to consider $A = \{1, 2, 3\}$ and $B = \{4, 5\}$. Next, consider $A = \{1, 2, 3\}$ and $B = \{1, 2, 5\}$.

A moment’s thought 2.10 Try some examples. A good start is to consider $A = \{1, 2, 3\}$ and $B = \{1, 5\}$. Next, consider $A = \{1, 2, 3\}$ and $B = \{1, 2, 3, 5\}$.

A moment’s thought 2.14 Try some examples. A good start is to consider $A = \{1, 2, 3\}$ and $B = \{1, 5\}$. Next, consider $A = \{1, 2, 3\}$ and $B = \{1, 2, 3, 5\}$.

A moment’s thought 2.17 Check that the conditions in Definition 2.16 apply.

A moment’s thought 2.18 Johnny Cash and June Carter both had children from their first marriages. After they married, they had a son. Which of the conditions of Definition 2.16 fails to hold in this case?

A moment’s thought 2.19 What must an assignment satisfy in order to be a function?

A moment’s thought 2.23 There are many well-known examples from calculus and trigonometry.

A moment’s thought 2.24 Which requirement is stronger: To be total or to be partial?
A moment’s thought 2.27 First, find an example of a function from \( A \) to \( B \). Then find the others.

A moment’s thought 2.28 How many functions did you find in A moment’s thought 2.27?

A moment’s thought 2.29 First, find an example of a partial function from \( A \) to \( B \) that fails to be total. Then find all other partial.

Chapter 3

A moment’s thought 3.1 How does the text define and exemplify the notion of immediate constituents?

A moment’s thought 3.6 Try using the rule to find a transition \( 3 + 4 \rightarrow v \).

A moment’s thought 3.9 Can we have transitions that are not derived from a transition rule?

Chapter 4

A moment’s thought 4.2 How many variables are there in a program? Finitely or infinitely many? How many variables are there in \( \text{Var} \)?

A moment’s thought 4.15 What do \( k \), \( k_1 \) and \( k_2 \) stand for?

A moment’s thought 4.17 How long is a transition sequence in a big-step semantics?

Chapter 5

A moment’s thought 5.3 Where and how was \( \rightarrow_h \) defined?

A moment’s thought 5.13 Have a look at the definitions of \( \sim_{sss} \) and \( \sim_{bss} \).

A moment’s thought 5.13 Have a look at the definition of \( \sim_{sss} \).

A moment’s thought 5.18 By which interleaving can we reach \( x := 1 \) as the last assignment?

A moment’s thought 5.21 Have another look at the example above. Will the while loops interfere?

Chapter 6

A moment’s thought 6.2 What did you answer in A moment’s thought 4.2? Why?

A moment’s thought 6.4 How was the update operation for environments defined?
A moment’s thought 6.6 Where are values of variables kept?

A moment’s thought 6.7 Can a Boolean expression be comprised of constituents from other syntactic categories? If yes, which ones?

A moment’s thought 6.9 What does the variable environment tell us about?

A moment’s thought 6.10 Try applying the transition rules to a transition \( \text{env}_V, \text{env}_P \vdash (S, \text{sto}) \rightarrow \text{sto}' \) where \( S \) is a sequential composition of the form \( \text{begin} \ D_V \ D_P \ P \ \text{end}; S_2 \). Which bindings are we using for the transition involving \( S_2 \)?

A moment’s thought 6.11 Which procedures do we know when performing a call, when we assume dynamic scope rules for procedures?

A moment’s thought 6.12 How easy is it read a program with dynamic scope rules? And one with static scope rules?

A moment’s thought 6.15 The example must have procedure declarations inside the body of a procedure.

Chapter 7

A moment’s thought 7.3 Which procedures do we know when \( p \) has been called? Remember that we assume dynamic scope rules for procedures.

A moment’s thought 7.9 Use the rules of the definition of substitution.

A moment’s thought 7.15 What is the binding construct in set abstraction (see Chapter 2)? And in an iterated sum \( \sum_{i=1}^{k} i^2 \)?

Chapter 8

A moment’s thought 8.12 Apply the definitions.

A moment’s thought 8.12 Apply the definitions!

Chapter 9

A moment’s thought 9.6 Do dynamically created objects always survive? Why not?

A moment’s thought 9.9 Which methods are known inside a method?

Chapter 10

A moment’s thought 10.1 Remember what scope rules tell us about.

A moment’s thought 10.2 What is the relationship between the top of the run-time stack and the active evaluation context?
A moment’s thought 10.3 What did you answer in A moment’s thought 7.3?

A moment’s thought 10.5 Some sort of correspondence. But which one?

Chapter 12

A moment’s thought 12.3 What do scope rules tell us?

A moment’s thought 12.4 Find an example where this is the case.

A moment’s thought 12.5 Think of the parameter mechanisms you saw in Chapter 7. What does \( e_1[x \mapsto e_2] \) stand for?

A moment’s thought 12.16 What corresponds to call-by-name in the \( \lambda \)-calculus?

Chapter 13

A moment’s thought 13.10 Try checking for well-typedness for a small program example and an environment \( E \). What do you do? When do you need to use the type rules? When do you need \( E \)?

A moment’s thought 13.26 The example can be very simple.

Chapter 14

A moment’s thought 14.9 Apply the clauses of the definition.

A moment’s thought 14.10 What would the denotation of a statement be, if \( S \) was of the first form? And if it was of the second form?

A moment’s thought 14.12 Do we need \( \lambda \)-notation in denotational semantics?

Chapter 15

A moment’s thought 15.13 Apply Definitions 15.10 and 15.11.

A moment’s thought 15.20 There is an important notion which occurs in the definition of cpos and of continuity. Which notion is that?

A moment’s thought 15.22 Is the real function \( f(x) = -x^3 \) monotonic (in the calculus sense)?

A moment’s thought 15.27 Find a calculus textbook which has an ‘epsilon-delta’-style definition of continuity.

A moment’s thought 15.28 What is an endofunction? What is a fixed point?

A moment’s thought 15.2 Everything gets turned around - but how?