As per usual, these are simply suggested solutions and there maybe solutions that differ from these, and yet be equally correct.

1 Activation trees and activation records

Question 1.1

Below an activation tree for $\text{fib}(5)$.

```
  fib(5)
   /   \
  /     \
/       \
fib(4)   fib(3)
 /     /     \
/     /     \\
nfib(3)  fib(2)  fib(2)  fib(1)  fib(1)  fib(0)  fib(1)  fib(0)
|     |     |     |     |     |     |     |
|fib(2) fib(1) fib(1) fib(0) fib(1) fib(0) fib(1) fib(0) |
```

Question 1.2

In the activation tree below, we color in red the calls that are still on the stack as the 5th $\text{fib}(1)$ is about to return. Note that we can easily find the 5th $\text{fib}(1)$ on the stack by performing a depth-first traversal through the activation tree.

```
  fib(5)
   /   \
  /     \
/       \
fib(4)   fib(3)
 /     /     \
/     /     \\
nfib(3)  fib(2)  fib(2)  fib(1)  fib(1)  fib(0)  fib(1)  fib(0)
|     |     |     |     |     |     |     |
|fib(2) fib(1) fib(1) fib(0) fib(1) fib(0) fib(1) fib(0) |
```
Below a diagram of the stack. Note that we label the direction of growth of the stack, to avoid confusion. Additionally, we provide control links and access links, as they are referenced in the Dragonbook, and provide alternate names for each (as students may know them under different terminology). Finally, each stack frame is labeled with the respective call, and provides space for the actual arguments, and local variables. The latter are simply declared when uninitialized, while initialized local variables show their respective value.