[Ex. 1] Write a server in erlang to convert temperatures from Celsius degrees to Fahrenheit degrees and vice versa, using the formula $F = 1.8C + 32$. The server receives requests of the form $(Pid, cs, C)$ or $(Pid, ft, F)$ and replies to $Pid$ by sending messages in analogous format. The server can be stopped by sending the message `stop`. All the other messages are ignored. Spawn a copy of the server, send it some temperatures to convert, check out the results and stop the server.

[Ex. 2] Write an erlang function `copy` that receives an integer $n$ and if $n$ is positive it prints $n$ copies of $n$ (one per line). Write an erlang function that receives a list of integers and spawn an instance of `copy` for each integer in the list.

[Ex. 3] Write an erlang function `view` that displays the content of the mailbox but makes all messages remain available in the mailbox afterwards.

[Ex. 4] Define a CCS process $B_n^k$ that represents an in/out buffer with capacity $n$ of which $k$ positions are taken. Show that $B_n^0$ is strongly bisimilar to $n$ copies of $B_1^0$ that run in parallel.

[Ex. 5] Write a guarded CCS process whose LTS has infinitely many states without using parallel composition.

[Ex. 6] Prove that CCS strong bisimilarity is a congruence w.r.t. restriction, i.e., that for all $p, q, \alpha$: 

\[ p \simeq q \Rightarrow p \\backslash \alpha \simeq q \\backslash \alpha \]

[Ex. 7] Prove that the CCS agents 

\[ p \equiv \alpha.(\alpha.\beta.\text{nil} + \alpha.(\beta.\text{nil} + \gamma.\text{nil})) \quad \text{and} \quad q \equiv \alpha.(\alpha.\beta.\text{nil} + \alpha.\gamma.\text{nil}) \]

are not strong bisimilar.

[Ex. 8] Let us consider the guarded CCS processes 

\[ p \equiv \text{rec } x.(\alpha.x + \beta.x) \quad q \equiv \text{rec } y.(\alpha.\text{nil} + \gamma.y) \quad r \equiv \text{rec } z.(\beta.\text{nil} + \gamma.z) \]

1. Draw the LTSs of the processes $p$, $q$, $r$ and $s \equiv (p|q|r)\\backslash \alpha\\backslash \beta\\backslash \gamma$.

2. Show that $s$ is strong bisimilar to the process \( t \equiv \text{rec } w.(\tau.w + \tau.\tau.\text{nil}) \).

[Ex. 9] Prove that the following property is valid for any agent $p$, where $\approx$ is the weak bisimilarity:

\[ p + \tau.p \approx \tau.p \]