[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 \((\text{Pid}, \text{cs}, C)\) or \((\text{Pid}, \text{ft}, F)\) and replies to \text{Pid} by sending messages in analogous format. The server can be stopped by sending the message \text{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 \text{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 \text{copy} for each integer in the list.

[Ex. 3] Write an erlang function \text{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 \( p, q, \alpha \):

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

[Ex. 7] Prove that the CCS agents

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

are not strong bisimilar.

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

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

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

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

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

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