Concurrent Programming - Exercícios 2

CCS seqeuntial

1. Solve the exercises of CCS_0 in `https://pseuco.com/#/exercises` (PseuCo.com)
2. Let $Act = \{a, b, c\}$, compute using the inference system:
   (a) $[\![a.b.0 + 0]\!]$
   (b) $[\![a.(b.0 + 0)]\!]$
   (c) $[\![a.b.c.0 + b.(0 + a.0)]\!]$
3. Consider the following definition of a coffee machine
$$CM := coin.coffee.CM$$
   (a) Compute Γ and $[\![CM]\!]_\Gamma$ and implement if in pseuco.com
   (b) Write a process that behaves as CM can steal the coin, i.e., does not give coffee.
   (c) Write a process that behaves as CM but can give coffee or tea.
   (d) Write a process that behaves as CM but can give tea for 0.5 euros and coffee for 1 euro.
   (e) Repeat (a) for the last questions.
4. Let
$$\begin{aligned}\Gamma \;=\; & \{(P, a.P_1), (P_1, b.P + c.P), (Q, a.Q_1) \\ & (Q_1, b.Q_2 + c.Q), (Q_2, a.Q_3), (Q_3, b.Q + c.Q_2)\}\end{aligned}$$
   Using the inference system $\longrightarrow_\Gamma$, compute $[\![P]\!]_\Gamma$ e $[\![Q]\!]_\Gamma$. Draw the diagrams. Implement in pseuco.com.
5. For each expression and set of equations, indicate the set Γ and the semantics of each expression using $\longrightarrow_\Gamma$.
   (a) $[\![A]\!]_\Gamma$ being $A := a(b.0 + b.c.A)$
   (b) $[\![B]\!]_\Gamma$ being $A := a.A + \tau.b.A$ and $B = a.A + b.A$
   (c) $[\![A]\!]_\Gamma$ being
$$\begin{aligned} C &:= c.C + D \\ D &:= 0 + c.C \end{aligned}$$
   (d) $[\![C_0]\!]_\Gamma$ being
$$\begin{aligned} C_0 &:= inc.C_1 \\ C_n &:= inc.C_{n+1} + dec.C_{n-1}, \text{ para } n \geq 1 \end{aligned}$$
   (e) $[\![X]\!]_\Gamma$ and $\Gamma = \{(X, X + 0)\}$
6. Say if A and B are guarded or unguarded: $A := a.A + B$ and $B := b.B + A$.
7. Say which variables are guarded in the following equations: $C := c.C + D$, $D := 0 + c.C$ $A := b.0 + A$ e $B := b.B + a.A$.