Assignment-4

Question 1-B:

Let us define the equivalence of high-order function g and its CPS version g$ like this, for any 0=<i=<n the CPS-equivalent parameters f1…fn and f1$...fn$ (g$ f1$...fn$ cont) is CPS-equivalent to (cont (g f1…fn))

Now, we are going to show that pipe is equivalent to pipe$, using induction on the size of the List.

1- Base: N=1
(cont (pipe(f1$))) = (cont f1$) & (pipe$ f1$ cont) = (cont (lambda (x c2) (f1$ x c2))) = (cont f1$)

2-Induction step: we assume that (pipe$ f1$ … fn$ cont) = (cont (pipe f1$ … fn$))

3-Prove it for n+1:

(pipe$ (f1$ … fn$ fn+1$ cont)) =
(pipe$ f2$ … fn+1$ (lambda (f2-n$) (cont (lambda (x c2) (f1$ x (lambda (res) (fn2-n$ res c2))))))) = ( )
(lambda (f2-n$) (cont (lambda (x c2) (f1$ x (lambda (res) (fn2-n$ res c2)))))) (pipe f2$ … fn+1$)
= (cont (lambda (x c2) ((pipe f2$ … fn+1$) x (lambda (res) (fn2-n$ res c2))))
= (cont (f2-n$ (pipe f1$ f2$ … fn+1$)) = (cont (pipe f1$ … fn+1$))

Question 2-b:

We will use reduce 1-lzl when we want to get a reduce for a finite lazy list.
We will use reduce 1-lzl when we want to get a reduce of one specific prefix of a given infinite lazy list.
We will use reduce 1-lzl when we want to get a reduce of each prefix of an infinite lazy list (as we use it in Q2e)

Question 2-g:

Advantage: unlike the pi-sum method, which is fixed to a single given 'b' limit, this method can be applied to any approximation level.
Disadvantage: Using this method generates a lot of closures.

Question 3-1:

1. $unify[x(y(y), T, y, z, k(K), y),\ x(y(T), T, y, z, k(K), L)]$

$S = \{\} \circ \{T = y, L = y\} = \{T = y, L = y\}$

$$\boxed{\begin{matrix} y(y) = y(T) \\ L = y \end{matrix}}$$

$unify[x(y(y), y, y, z, k(K), y),\ x(y(y), y, y, z, k(K), y)]$

$S = \{T = y, L = y\}$

2. $unify[f(a, M, f, F, Z, f, x(M)),\ f(a, x(Z), f, x(M), x(F), f, x(M))]$

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$$\boxed{\begin{matrix} M = x(Z) & & M = x(x(x(M))) \\ F = x(M) & \Rightarrow & F = x(x(x(F))) \\ Z = x(F) & & Z = x(x(x(Z))) \end{matrix}}$$

3. $unify[t(A, B, C, n(A, B, C), x, y)\ \ t(a, b, c, m(A, B, C), X, Y)]$

$$\boxed{\begin{matrix} A = a & X = x \\ B = b & Y = y \\ C = c & \end{matrix}}$$

$$\boxed{S = \{A = a, B = b, C = c, X = x, Y = y\}}$$

$unify[t(a, b, c, n(a, b, c), x, y)\ \ t(a, b, c, m(a, b, c), x, y)]$

4. $unify[z(a(A, x, Y), D, g),\ z(a(d, x, g), g, Y)]$

$S = \{\} \circ \{D = g, Y = g\}$

$$\boxed{\begin{matrix} a(A, x, Y) = a(d, x, g) \\ D = g \\ Y = g \end{matrix}}$$

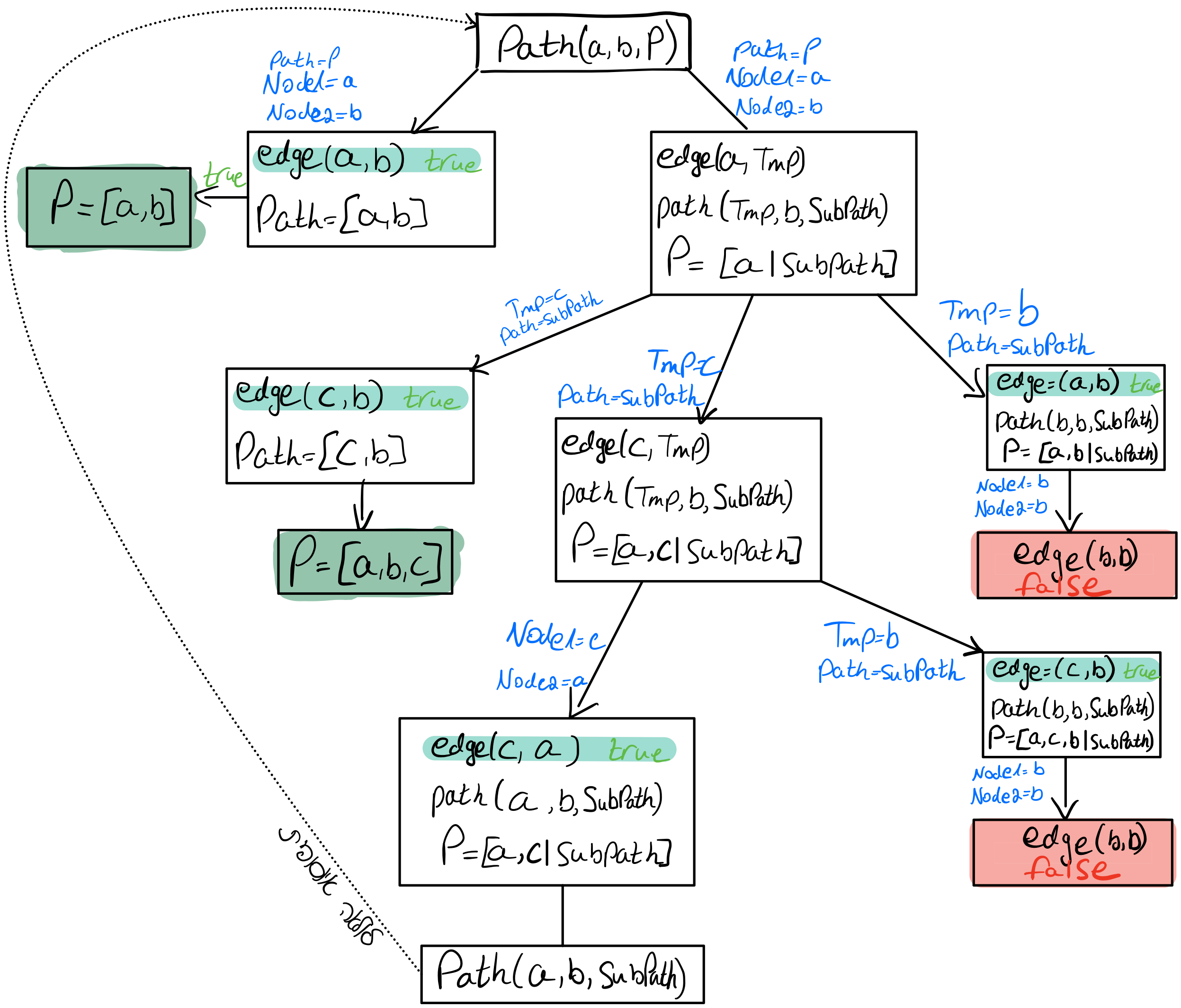
$unify[a(A, x, Y), a(d, x, g)]$

$S' = \{A = d, Y = g\}$

$unify[z(a(d, x, g), g, g),\ z(a(d, x, g), g, g)]$

$$\boxed{S = S \circ S' = \{D = g, Y = g, A = d\}}$$

Question 3-3:



→ according to the given proof Tree it's infinite tree.

→ according to the given proof Tree we have more than one success path therefore it's success tree.