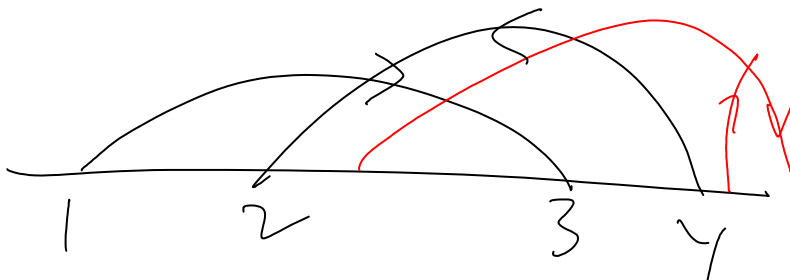
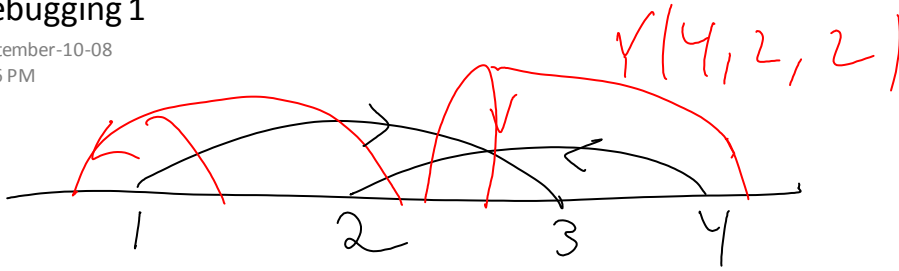
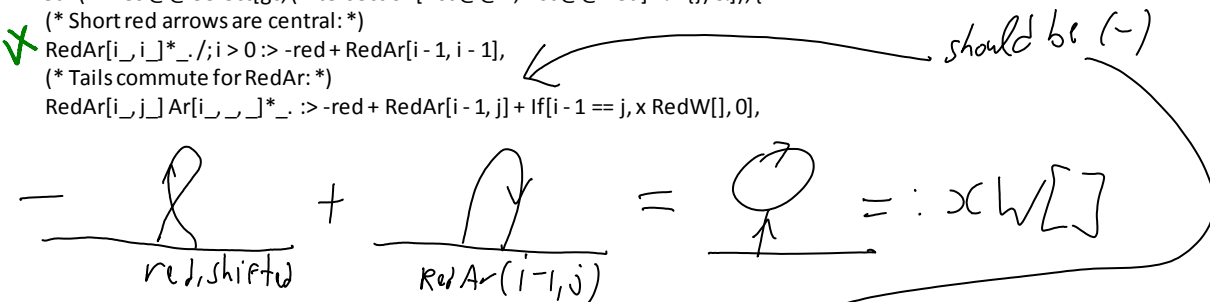


# Debugging 1

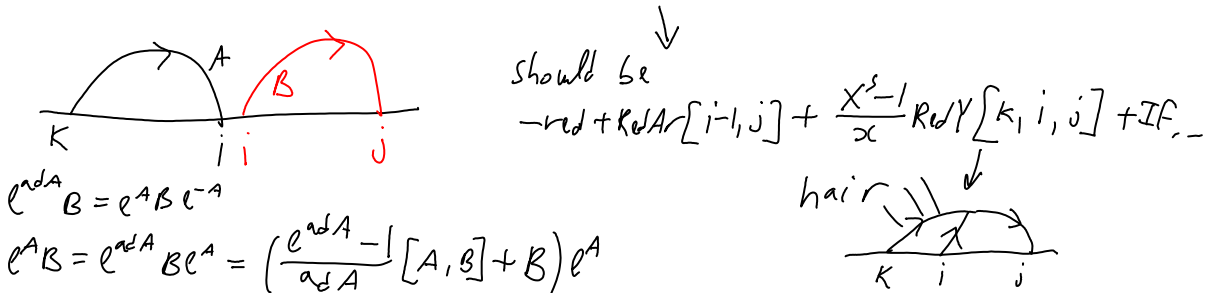
September-10-08  
4:26 PM



```
RelationsIn[gc_GC, red_] := ReplaceList[
red*(Times @@ Select[gc, (Intersection[List @@ #, List @@ red] != {})&]), {
(* Short red arrows are central: *)
RedAr[i_, i_] * _ /; i > 0 -> -red + RedAr[i - 1, i - 1],
(* Tails commute for RedAr: *)
RedAr[i_, j_] Ar[i_, j_] * _ -> -red + RedAr[i - 1, j] + If[i - 1 == j, x RedW[], 0],
```



```
(* Commuting a RedAr tail across an Ar head *)
RedAr[i_, j_] Ar[k_, i_, s_] * _ -> -red + RedAr[i - 1, j] + (X^s - 1) RedY[k, i, j] + If[i - 1 == j, x RedW[], 0],
```



$$e^{red A} B = e^A B e^{-A}$$

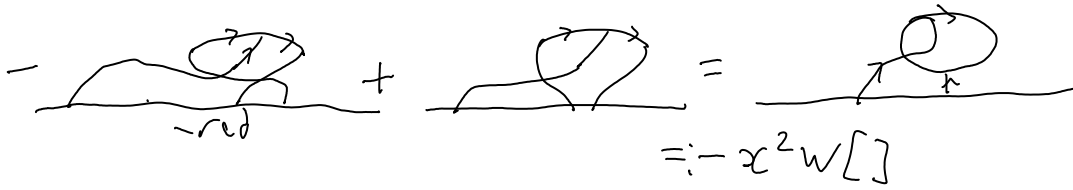
$$e^A B = e^{red A} B e^A = \left( \frac{e^{red A} - 1}{red A} [A, B] + B \right) e^A$$

```
(* Commuting the head of a RedAr with the head of an Ar *)
(* RedAr[i_, j_] Ar[k_, j_, s_] * _ -> -red + RedAr[i, j - 1] - (X^s - 1) / x RedY[k, i, j - 1] - If[i == j - 1, x RedW[], 0], *)
```

```
(* The anti-symmetry of RedY: *)
RedY[i_, i_, k_] * _ -> red,
RedY[i_, j_, k_] * _ /; i > j -> red + RedY[j, i, k], } can be simplified: remove
the first & the i > j condition
from the second.
```

```
(* Tails commute for RedY: *)
RedY[i_, j_, k_] Ar[i_, j_, s_] * _ -> -red + RedY[i - 1, j, k] + If[i - 1 == k, x^2 RedW[], 0],
```

V  $\text{RedY}[i, j, k] \text{Ar}[j, \dots]^* \rightarrow -\text{red} + \text{RedY}[i, j-1, k] + \text{If}[j-1 == k, -x^2 \text{RedW}[], 0],$



(\* Commuting a RedY tail across an Ar head \*)

$\text{RedY}[i, j, k] \text{Ar}[l, j, s]^* \rightarrow -\text{red} + \text{RedY}[i, j-1, k] - (X^s - 1) \text{RedY}[l, j, k] + \text{If}[j-1 == k, -x^2 \text{RedW}[], 0]$



} not fully checked

}  
|