(Debug) In[106]:=
```
SetDirectory[
 "/Users/marco/marco.live/TEX/2014/BUTTER&JAM/svn/code/Mathematica"]
```

(Debug) Out[106]=
```
/Users/marco/marco.live/TEX/2014/BUTTER&JAM/svn/code/Mathematica
```

(Debug) In[107]:=
```
<< "wInv.ma"
```

(Debug) In[108]:=
```
ForwardVisit = Function[tw, FVLastStep@Fold[FVStep, FVBase, tw]];
BackwardVisit = Function[tw, BVLastStep@Fold[BVStep, BVBase, tw]];

wRevInitBase = {};
wRevInitStep[tail_, element_] :=
 Module[{u, v, g1, g2, m, stop, sn, rs, fwdv, fwdg2, fwdm},
  (
   u = element[[1]];
   v = element[[2]];
   g1 = element[[3]];
   g2 = element[[4]];
   m = element[[5]];
   stop = element[[6]];
   sn = element[[7]];
   rs = element[[8]];
   fwdv = element[[9]];
   fwdg2 = element[[10]];
   fwdm = element[[11]];


   Prepend[tail, { u, v, g1, g2, m, stop, B, B, 0, 0, 0}]

  )]

wRevInit = Function[tw, Fold[wRevInitStep, wRevInitBase, tw]];
```

(Debug) In[113]:=
```
(*second example*)

U1 = {0, 1, 0, 0}
p1 = {1, 0, 1, 1}

(* paper example *)
U = {0, 1, 0, 0}
p = {1, 0, 1, 1}

baseinput =
 {U,
  p,
  {0, 0, 0, 1},
  {0, 0, 0, 0},
  p,
  {0, 0, 0, 0},
  {B, B, B, B},
  {B, B, B, B},
  {0, 0, 0, 0},
  {0, 0, 0, 0},
  {0, 0, 0, 0}
 }

base = MapThread[List, baseinput];
TableForm@base
```

(Debug) Out[113]= {0, 1, 0, 0}

(Debug) Out[114]= {1, 0, 1, 1}

(Debug) Out[115]= {0, 1, 0, 0}

(Debug) Out[116]= {1, 0, 1, 1}

(Debug) Out[117]= {{0, 1, 0, 0}, {1, 0, 1, 1}, {0, 0, 0, 1}, {0, 0, 0, 0}, {1, 0, 1, 1}, {0, 0, 0, 0}, {B, B, B, B}, {B, B, B, B}, {0, 0, 0, 0}, {0, 0, 0, 0}, {0, 0, 0, 0}}

(Debug) Out[118]//TableForm=

0	1	0	0	1	0	B	B	0	0	0
1	0	0	0	0	0	B	B	0	0	0
0	1	0	0	1	0	B	B	0	0	0
0	1	1	0	1	0	B	B	0	0	0

(Debug) In[169]:=
```
F0 = wRevInit[BackwardVisit@ForwardVisit@Reverse@base];
F1 = wRevInit[BackwardVisit@ForwardVisit@Reverse@F0];
F2 = wRevInit[BackwardVisit@ForwardVisit@Reverse@F1];
F3 = wRevInit[BackwardVisit@ForwardVisit@Reverse@F2];
TableForm@F0
TableForm@F1
TableForm@F2
TableForm@F3
```

```
in1 : {0, 1, 1, 0, 1, 0, B, B, 0, 0, 0}

in2 : {#1 &, {B, B, B, B, B, B, B, B, B, B, B}, {}}

stopt :B
u     :0
snt   :B
sn   :B
rst   :B
rs    :B
g1b   :1
```

```
case : stopt=B;snt=B;u=0;g1=1

{{0, B, 0, B, B, B, 0, 0, 1, 0, 1}, {B, B, B, B, B, B, B, B, B, B, B}}

in1 : {0, 1, 0, 0, 1, 0, B, B, 0, 0, 0}

in2 : {Prepend, {0, B, 0, B, B, B, 0, 0, 1, 0, 1}, {}}

stopt :B
u     :0
snt   :0
sn   :B
rst   :0
rs    :B
g1b   :0

case : stopt=B;snt=0;rst=0

{{0, 1, 1, B, 1, B, 0, 0, 1, 0, 1}, {0, B, 0, 0, B, B, 0, 0, 1, 0, 1}}

in1 : {1, 0, 0, 0, 0, 0, B, B, 0, 0, 0}

in2 : {Prepend, {0, 1, 1, B, 1, B, 0, 0, 1, 0, 1}, {{0, B, 0, 0, B, B, 0, 0, 1, 0, 1}}}

stopt :B
u     :1
snt   :0
sn   :B
rst   :0
rs    :B
g1b   :0

case : stopt=B;snt=0;rst=0

{{1, 1, 0, B, 1, B, 0, 0, 0, 0, 0}, {0, 1, 1, 0, 1, B, 0, 0, 1, 0, 1}}

in1 : {0, 1, 0, 0, 1, 0, B, B, 0, 0, 0}

in2 : {Prepend, {1, 1, 0, B, 1, B, 0, 0, 0, 0, 0},
  {{0, 1, 1, 0, 1, B, 0, 0, 1, 0, 1}, {0, B, 0, 0, B, B, 0, 0, 1, 0, 1}}}

stopt :B
u     :0
snt   :0
sn   :B
rst   :0
rs    :B
g1b   :0

case : stopt=B;snt=0;rst=0

{{0, 0, 1, B, 0, B, 0, 0, 1, 0, 1}, {1, 1, 0, 0, 1, B, 0, 0, 0, 0, 0}}

last step input :
 {Prepend, {0, 0, 1, B, 0, B, 0, 0, 1, 0, 1}, {{1, 1, 0, 0, 1, B, 0, 0, 0, 0, 0},
   {0, 1, 1, 0, 1, B, 0, 0, 1, 0, 1}, {0, B, 0, 0, B, B, 0, 0, 1, 0, 1}}}

branch = stopt=B;rst=0;

out    = {{0, 1, 0, 0, 1, B, B, 0, B, B, B},
  {0, 0, 1, 0, 0, B, 0, 0, 1, 0, 1}, {1, 1, 0, 0, 1, B, 0, 0, 0, 0, 0},
  {0, 1, 1, 0, 1, B, 0, 0, 1, 0, 1}, {0, B, 0, 0, B, B, 0, 0, 1, 0, 1}}

in1 : {0, 1, 0, 0, 1, B, B, 0, B, B, B}

in2 : {#1 &, {B, B, B, B, B, B, B, B, B, B, B}, {}}

stopt :B
rst   :B
rs    :0
stop  :B
u     :0
v     :1

case : stopt=B;rs=0;
```

```
{{0, 1, 0, 0, 1, B, B, 0, B, B, B}, {B, B, B, B, B, B, B, 0, B, B, B}}

in1 : {0, 0, 1, 0, 0, B, 0, 0, 1, 0, 1}

in2 : {Prepend, {0, 1, 0, 0, 1, B, B, 0, B, B, B}, {}}

stopt :B
rst   :0
rs    :0
stop  :B
u     :0
v     :0

case : stopt=B;rs=0;

{{0, 0, 1, 0, 0, B, 0, 0, B, B, B}, {0, 1, 0, 0, 1, B, B, 0, B, B, B}}

in1 : {1, 1, 0, 0, 1, B, 0, 0, 0, 0, 0}

in2 : {Prepend, {0, 0, 1, 0, 0, B, 0, 0, B, B, B}, {{0, 1, 0, 0, 1, B, B, 0, B, B, B}}}

stopt :B
rst   :0
rs    :0
stop  :B
u     :1
v     :1

case : stopt=B;rs=0;

{{1, 1, 0, 0, 1, B, 0, 0, B, B, B}, {0, 0, 1, 0, 0, B, 0, 0, B, B, B}}

in1 : {0, 1, 1, 0, 1, B, 0, 0, 1, 0, 1}

in2 : {Prepend, {1, 1, 0, 0, 1, B, 0, 0, B, B, B},
  {{0, 0, 1, 0, 0, B, 0, 0, B, B, B}, {0, 1, 0, 0, 1, B, B, 0, B, B, B}}}

stopt :B
rst   :0
rs    :0
stop  :B
u     :0
v     :1

case : stopt=B;rs=0;

{{0, 1, 1, 0, 1, B, 0, 0, B, B, B}, {1, 1, 0, 0, 1, B, 0, 0, B, B, B}}

in1 : {0, B, 0, 0, B, B, 0, 0, 1, 0, 1}

in2 : {Prepend, {0, 1, 1, 0, 1, B, 0, 0, B, B, B}, {{1, 1, 0, 0, 1, B, 0, 0, B, B, B},
    {0, 0, 1, 0, 0, B, 0, 0, B, B, B}, {0, 1, 0, 0, 1, B, B, 0, B, B, B}}}

stopt :B
rst   :0
rs    :0
stop  :B
u     :0
v     :B

case : stopt=B;rs=0;

{{0, B, 0, 0, B, B, 0, 0, B, B, B}, {0, 1, 1, 0, 1, B, 0, 0, B, B, B}}

last step input : {Prepend, {0, B, 0, 0, B, B, 0, 0, B, B, B},
  {{0, 1, 1, 0, 1, B, 0, 0, B, B, B}, {1, 1, 0, 0, 1, B, 0, 0, B, B, B},
   {0, 0, 1, 0, 0, B, 0, 0, B, B, B}, {0, 1, 0, 0, 1, B, B, 0, B, B, B}}}

in1 : {0, 1, 1, 0, 1, B, B, B, 0, 0, 0}

in2 : {#1 &, {B, B, B, B, B, B, B, B, B, B, B}, {}}
```

```
stopt :B
u     :0
snt   :B
sn   :B
rst   :B
rs    :B
g1b   :1
```

```
case : stopt=B;snt=B;u=0;g1=1
```

```
{{0, B, 0, B, B, B, 0, 0, 1, 0, 1}, {B, B, B, B, B, B, B, B, B, B, B}}
```

```
in1 : {1, 1, 0, 0, 1, B, B, B, 0, 0, 0}
```

```
in2 : {Prepend, {0, B, 0, B, B, B, 0, 0, 1, 0, 1}, {}}
```

```
stopt :B
u     :1
snt   :0
sn   :B
rst   :0
rs    :B
g1b   :0
```

```
case : stopt=B;snt=0;rst=0
```

```
{{1, 1, 1, B, 1, B, 0, 0, 1, 0, 1}, {0, B, 0, 0, B, B, 0, 0, 1, 0, 1}}
```

```
in1 : {0, 0, 1, 0, 0, B, B, B, 0, 0, 0}
```

```
in2 : {Prepend, {1, 1, 1, B, 1, B, 0, 0, 1, 0, 1}, {{0, B, 0, 0, B, B, 0, 0, 1, 0, 1}}}
```

```
stopt :B
u     :0
snt   :0
sn   :B
rst   :0
rs    :B
g1b   :1
```

```
case : stopt=B;snt=0;rst=0
```

```
{{0, 1, 1, B, 1, B, 0, 0, 0, 0, 0}, {1, 1, 1, 0, 1, B, 0, 0, 1, 0, 1}}
```

```
in1 : {0, 1, 0, 0, 1, B, B, B, 0, 0, 0}
```

```
in2 : {Prepend, {0, 1, 1, B, 1, B, 0, 0, 0, 0, 0},
  {{1, 1, 1, 0, 1, B, 0, 0, 1, 0, 1}, {0, B, 0, 0, B, B, 0, 0, 1, 0, 1}}}
```

```
stopt :B
u     :0
snt   :0
sn   :B
rst   :0
rs    :B
g1b   :0
```

```
case : stopt=B;snt=0;rst=0
```

```
{{0, 0, 1, B, 0, B, 0, 0, 1, 0, 1}, {0, 1, 1, 0, 1, B, 0, 0, 0, 0, 0}}
```

```
last step input :
 {Prepend, {0, 0, 1, B, 0, B, 0, 0, 1, 0, 1}, {{0, 1, 1, 0, 1, B, 0, 0, 0, 0, 0},
   {1, 1, 1, 0, 1, B, 0, 0, 1, 0, 1}, {0, B, 0, 0, B, B, 0, 0, 1, 0, 1}}}
```

```
branch = stopt=B;rst=0;
```

```
out    = {{0, 1, 0, 0, 1, B, B, 0, B, B, B},
  {0, 0, 1, 0, 0, B, 0, 0, 1, 0, 1}, {0, 1, 1, 0, 1, B, 0, 0, 0, 0, 0},
  {1, 1, 1, 0, 1, B, 0, 0, 1, 0, 1}, {0, B, 0, 0, B, B, 0, 0, 1, 0, 1}}
```

```
in1 : {0, 1, 0, 0, 1, B, B, 0, B, B, B}
```

```
in2 : {#1 &, {B, B, B, B, B, B, B, B, B, B, B}, {}}
```

```
stopt :B
rst   :B
rs    :0
stop  :B
u     :0
v     :1
```

```
case : stopt=B;rs=0;
```

```
{{0, 1, 0, 0, 1, B, B, 0, B, B, B}, {B, B, B, B, B, B, B, 0, B, B, B}}
```

```
in1 : {0, 0, 1, 0, 0, B, 0, 0, 1, 0, 1}
```

```
in2 : {Prepend, {0, 1, 0, 0, 1, B, B, 0, B, B, B}, {}}
```

```
stopt :B
rst   :0
rs    :0
stop  :B
u     :0
v     :0
```

```
case : stopt=B;rs=0;
```

```
{{0, 0, 1, 0, 0, B, 0, 0, B, B, B}, {0, 1, 0, 0, 1, B, B, 0, B, B, B}}
```

```
in1 : {0, 1, 1, 0, 1, B, 0, 0, 0, 0, 0}
```

```
in2 : {Prepend, {0, 0, 1, 0, 0, B, 0, 0, B, B, B}, {{0, 1, 0, 0, 1, B, B, 0, B, B, B}}}
```

```
stopt :B
rst   :0
rs    :0
stop  :B
u     :0
v     :1
```

```
case : stopt=B;rs=0;
```

```
{{0, 1, 1, 0, 1, B, 0, 0, B, B, B}, {0, 0, 1, 0, 0, B, 0, 0, B, B, B}}
```

```
in1 : {1, 1, 1, 0, 1, B, 0, 0, 1, 0, 1}
```

```
in2 : {Prepend, {0, 1, 1, 0, 1, B, 0, 0, B, B, B},
  {{0, 0, 1, 0, 0, B, 0, 0, B, B, B}, {0, 1, 0, 0, 1, B, B, 0, B, B, B}}}
```

```
stopt :B
rst   :0
rs    :0
stop  :B
u     :1
v     :1
```

```
case : stopt=B;rs=0;
```

```
{{1, 1, 1, 0, 1, B, 0, 0, B, B, B}, {0, 1, 1, 0, 1, B, 0, 0, B, B, B}}
```

```
in1 : {0, B, 0, 0, B, B, 0, 0, 1, 0, 1}
```

```
in2 : {Prepend, {1, 1, 1, 0, 1, B, 0, 0, B, B, B}, {{0, 1, 1, 0, 1, B, 0, 0, B, B, B},
    {0, 0, 1, 0, 0, B, 0, 0, B, B, B}, {0, 1, 0, 0, 1, B, B, 0, B, B, B}}}
```

```
stopt :B
rst   :0
rs    :0
stop  :B
u     :0
v     :B
```

```
case : stopt=B;rs=0;
```

```
{{0, B, 0, 0, B, B, 0, 0, B, B, B}, {1, 1, 1, 0, 1, B, 0, 0, B, B, B}}
```

```
last step input : {Prepend, {0, B, 0, 0, B, B, 0, 0, B, B, B},
  {{1, 1, 1, 0, 1, B, 0, 0, B, B, B}, {0, 1, 1, 0, 1, B, 0, 0, B, B, B},
   {0, 0, 1, 0, 0, B, 0, 0, B, B, B}, {0, 1, 0, 0, 1, B, B, 0, B, B, B}}}
```

```
in1 : {1, 1, 1, 0, 1, B, B, B, 0, 0, 0}

in2 : {#1 &, {B, B, B, B, B, B, B, B, B, B, B}, {}}

stopt :B
u     :1
snt   :B
sn   :B
rst   :B
rs    :B
g1b   :1

case : stopt=B;snt=B;u=1

{{1, 1, 1, 0, 1, 0, 0, B, 1, 0, 1}, {B, B, B, B, B, B, B, B, B, B, B}}

in1 : {0, 1, 1, 0, 1, B, B, B, 0, 0, 0}

in2 : {Prepend, {1, 1, 1, 0, 1, 0, 0, B, 1, 0, 1}, {}}

stopt :0
u     :0
snt   :0
sn   :B
rst   :B
rs    :B
g1b   :1

case : stopt=0;u=0;snt=0

{{0, 1, 1, 0, 1, 0, 0, B, B, B, B}, {1, 1, 1, 0, 1, 0, 0, B, 1, 0, 1}}

in1 : {0, 0, 1, 0, 0, B, B, B, 0, 0, 0}

in2 : {Prepend, {0, 1, 1, 0, 1, 0, 0, B, B, B, B}, {{1, 1, 1, 0, 1, 0, 0, B, 1, 0, 1}}}

stopt :0
u     :0
snt   :0
sn   :B
rst   :B
rs    :B
g1b   :1

case : stopt=0;u=0;snt=0

{{0, 0, 1, 0, 0, 0, 0, B, B, B, B}, {0, 1, 1, 0, 1, 0, 0, B, B, B, B}}

in1 : {0, 1, 0, 0, 1, B, B, B, 0, 0, 0}

in2 : {Prepend, {0, 0, 1, 0, 0, 0, 0, B, B, B, B},
  {{0, 1, 1, 0, 1, 0, 0, B, B, B, B}, {1, 1, 1, 0, 1, 0, 0, B, 1, 0, 1}}}

stopt :0
u     :0
snt   :0
sn   :B
rst   :B
rs    :B
g1b   :0

case : stopt=0;u=0;snt=0

{{0, 1, 0, 0, 1, 0, 0, B, B, B, B}, {0, 0, 1, 0, 0, 0, 0, B, B, B, B}}

last step input :
 {Prepend, {0, 1, 0, 0, 1, 0, 0, B, B, B, B}, {{0, 0, 1, 0, 0, 0, 0, B, B, B, B},
   {0, 1, 1, 0, 1, 0, 0, B, B, B, B}, {1, 1, 1, 0, 1, 0, 0, B, 1, 0, 1}}}

branch = stopt=0;snt=0;

out    = {{0, 1, 0, 0, 1, 1, B, B, B, B, B}, {0, 0, 1, 0, 0, 0, 0, B, B, B, B},
  {0, 1, 1, 0, 1, 0, 0, B, B, B, B}, {1, 1, 1, 0, 1, 0, 0, B, 1, 0, 1}}

in1 : {0, 1, 0, 0, 1, 1, B, B, B, B, B}
```

```
in2 : {#1 &, {B, B, B, B, B, B, B, B, B, B, B}, {}}

stopt :B
rst   :B
rs    :B
stop  :1
u     :0
v     :1

case : stopt=B;rs=B;stop=1;

{{0, 1, 0, 0, 1, 1, B, B, B, B, B}, {B, B, B, B, B, B, B, B, B, B, B}}

in1 : {0, 0, 1, 0, 0, 0, 0, B, B, B, B}

in2 : {Prepend, {0, 1, 0, 0, 1, 1, B, B, B, B, B}, {}}

stopt :1
rst   :B
rs    :B
stop  :0
u     :0
v     :0

case : stopt=1

{{0, 0, 1, 0, 0, 1, 0, B, B, B, B}, {0, 1, 0, 0, 1, B, B, B, B, B, B}}

in1 : {0, 1, 1, 0, 1, 0, 0, B, B, B, B}

in2 : {Prepend, {0, 0, 1, 0, 0, 1, 0, B, B, B, B}, {{0, 1, 0, 0, 1, B, B, B, B, B, B}}}

stopt :1
rst   :B
rs    :B
stop  :0
u     :0
v     :1

case : stopt=1

{{0, 1, 1, 0, 1, 1, 0, B, B, B, B}, {0, 0, 1, 0, 0, B, B, B, B, B, B}}

in1 : {1, 1, 1, 0, 1, 0, 0, B, 1, 0, 1}

in2 : {Prepend, {0, 1, 1, 0, 1, 1, 0, B, B, B, B},
  {{0, 0, 1, 0, 0, B, B, B, B, B, B}, {0, 1, 0, 0, 1, B, B, B, B, B, B}}}

stopt :1
rst   :B
rs    :B
stop  :0
u     :1
v     :1

case : stopt=1

{{1, 1, 1, 0, 1, 1, 0, B, 1, 0, 1}, {0, 1, 1, 0, 1, B, B, B, B, B, B}}

last step input :
 {Prepend, {1, 1, 1, 0, 1, 1, 0, B, 1, 0, 1}, {{0, 1, 1, 0, 1, B, B, B, B, B, B},
   {0, 0, 1, 0, 0, B, B, B, B, B, B}, {0, 1, 0, 0, 1, B, B, B, B, B, B}}}

in1 : {1, 1, 1, 0, 1, B, B, B, 0, 0, 0}

in2 : {#1 &, {B, B, B, B, B, B, B, B, B, B, B}, {}}

stopt :B
u     :1
snt   :B
sn   :B
rst   :B
rs    :B
g1b   :1

case : stopt=B;snt=B;u=1
```

```
{{1, 1, 1, 0, 1, 0, 0, B, 1, 0, 1}, {B, B, B, B, B, B, B, B, B, B, B}}

in1 : {0, 1, 1, 0, 1, B, B, B, 0, 0, 0}

in2 : {Prepend, {1, 1, 1, 0, 1, 0, 0, B, 1, 0, 1}, {}}

stopt :0
u     :0
snt   :0
sn   :B
rst   :B
rs    :B
g1b   :1

case : stopt=0;u=0;snt=0

{{0, 1, 1, 0, 1, 0, 0, B, B, B, B}, {1, 1, 1, 0, 1, 0, 0, B, 1, 0, 1}}

in1 : {0, 0, 1, 0, 0, B, B, B, 0, 0, 0}

in2 : {Prepend, {0, 1, 1, 0, 1, 0, 0, B, B, B, B}, {{1, 1, 1, 0, 1, 0, 0, B, 1, 0, 1}}}

stopt :0
u     :0
snt   :0
sn   :B
rst   :B
rs    :B
g1b   :1

case : stopt=0;u=0;snt=0

{{0, 0, 1, 0, 0, 0, 0, B, B, B, B}, {0, 1, 1, 0, 1, 0, 0, B, B, B, B}}

in1 : {0, 1, 0, 0, 1, B, B, B, 0, 0, 0}

in2 : {Prepend, {0, 0, 1, 0, 0, 0, 0, B, B, B, B},
  {{0, 1, 1, 0, 1, 0, 0, B, B, B, B}, {1, 1, 1, 0, 1, 0, 0, B, 1, 0, 1}}}

stopt :0
u     :0
snt   :0
sn   :B
rst   :B
rs    :B
g1b   :0

case : stopt=0;u=0;snt=0

{{0, 1, 0, 0, 1, 0, 0, B, B, B, B}, {0, 0, 1, 0, 0, 0, 0, B, B, B, B}}

last step input :
 {Prepend, {0, 1, 0, 0, 1, 0, 0, B, B, B, B}, {{0, 0, 1, 0, 0, 0, 0, B, B, B, B},
   {0, 1, 1, 0, 1, 0, 0, B, B, B, B}, {1, 1, 1, 0, 1, 0, 0, B, 1, 0, 1}}}

branch = stopt=0;snt=0;

out    = {{0, 1, 0, 0, 1, 1, B, B, B, B, B}, {0, 0, 1, 0, 0, 0, 0, B, B, B, B},
  {0, 1, 1, 0, 1, 0, 0, B, B, B, B}, {1, 1, 1, 0, 1, 0, 0, B, 1, 0, 1}}

in1 : {0, 1, 0, 0, 1, 1, B, B, B, B, B}

in2 : {#1 &, {B, B, B, B, B, B, B, B, B, B, B}, {}}

stopt :B
rst   :B
rs    :B
stop  :1
u     :0
v     :1

case : stopt=B;rs=B;stop=1;

{{0, 1, 0, 0, 1, 1, B, B, B, B, B}, {B, B, B, B, B, B, B, B, B, B, B}}

in1 : {0, 0, 1, 0, 0, 0, 0, B, B, B, B}
```

```
in2 : {Prepend, {0, 1, 0, 0, 1, 1, B, B, B, B, B}, {}}

stopt :1
rst   :B
rs    :B
stop  :0
u     :0
v     :0

case : stopt=1

{{0, 0, 1, 0, 0, 1, 0, B, B, B, B}, {0, 1, 0, 0, 1, B, B, B, B, B, B}}

in1 : {0, 1, 1, 0, 1, 0, 0, B, B, B, B}

in2 : {Prepend, {0, 0, 1, 0, 0, 1, 0, B, B, B, B}, {{0, 1, 0, 0, 1, B, B, B, B, B, B}}}

stopt :1
rst   :B
rs    :B
stop  :0
u     :0
v     :1

case : stopt=1

{{0, 1, 1, 0, 1, 1, 0, B, B, B, B}, {0, 0, 1, 0, 0, B, B, B, B, B, B}}

in1 : {1, 1, 1, 0, 1, 0, 0, B, 1, 0, 1}

in2 : {Prepend, {0, 1, 1, 0, 1, 1, 0, B, B, B, B},
  {{0, 0, 1, 0, 0, B, B, B, B, B, B}, {0, 1, 0, 0, 1, B, B, B, B, B, B}}}

stopt :1
rst   :B
rs    :B
stop  :0
u     :1
v     :1

case : stopt=1

{{1, 1, 1, 0, 1, 1, 0, B, 1, 0, 1}, {0, 1, 1, 0, 1, B, B, B, B, B, B}}

last step input :
 {Prepend, {1, 1, 1, 0, 1, 1, 0, B, 1, 0, 1}, {{0, 1, 1, 0, 1, B, B, B, B, B, B},
   {0, 0, 1, 0, 0, B, B, B, B, B, B}, {0, 1, 0, 0, 1, B, B, B, B, B, B}}}
```

(Debug) Out[173]//TableForm=

0	1	0	0	1	B	B	B	0	0	0
0	0	1	0	0	B	B	B	0	0	0
1	1	0	0	1	B	B	B	0	0	0
0	1	1	0	1	B	B	B	0	0	0

(Debug) Out[174]//TableForm=

0	1	0	0	1	B	B	B	0	0	0
0	0	1	0	0	B	B	B	0	0	0
0	1	1	0	1	B	B	B	0	0	0
1	1	1	0	1	B	B	B	0	0	0

(Debug) Out[175]//TableForm=

0	1	0	0	1	B	B	B	0	0	0
0	0	1	0	0	B	B	B	0	0	0
0	1	1	0	1	B	B	B	0	0	0
1	1	1	0	1	B	B	B	0	0	0

(Debug) Out[176]//TableForm=

0	1	0	0	1	B	B	B	0	0	0
0	0	1	0	0	B	B	B	0	0	0
0	1	1	0	1	B	B	B	0	0	0
1	1	1	0	1	B	B	B	0	0	0

(Debug) In[135]:=
```
<< "wInv.ma"
TableForm@F1
X6 = ForwardVisit@Reverse@F1;
TableForm@X6
```

(Debug) Out[136]//TableForm=

0	1	0	0	1	B	B	B	0	0	0
0	0	1	0	0	B	B	B	0	0	0
0	1	1	0	1	B	B	B	0	0	0
1	1	1	0	1	B	B	B	0	0	0

```
in1 : {1, 1, 1, 0, 1, B, B, B, 0, 0, 0}

in2 : {#1 &, {B, B, B, B, B, B, B, B, B, B, B}, {}}

stopt :B
u     :1
snt   :B
sn   :B
rst   :B
rs    :B
g1b   :1

case : stopt=B;snt=B;u=1

{{1, 1, 1, 0, 1, 0, 0, B, 1, 0, 1}, {B, B, B, B, B, B, B, B, B, B, B}}

in1 : {0, 1, 1, 0, 1, B, B, B, 0, 0, 0}

in2 : {Prepend, {1, 1, 1, 0, 1, 0, 0, B, 1, 0, 1}, {}}

stopt :0
u     :0
snt   :0
sn   :B
rst   :B
rs    :B
g1b   :1

case : stopt=0;u=0;snt=0

{{0, 1, 1, 0, 1, 0, 0, B, B, B, B}, {1, 1, 1, 0, 1, 0, 0, B, 1, 0, 1}}

in1 : {0, 0, 1, 0, 0, B, B, B, 0, 0, 0}

in2 : {Prepend, {0, 1, 1, 0, 1, 0, 0, B, B, B, B}, {{1, 1, 1, 0, 1, 0, 0, B, 1, 0, 1}}}

stopt :0
u     :0
snt   :0
sn   :B
rst   :B
rs    :B
g1b   :1

case : stopt=0;u=0;snt=0

{{0, 0, 1, 0, 0, 0, 0, B, B, B, B}, {0, 1, 1, 0, 1, 0, 0, B, B, B, B}}

in1 : {0, 1, 0, 0, 1, B, B, B, 0, 0, 0}

in2 : {Prepend, {0, 0, 1, 0, 0, 0, 0, B, B, B, B},
  {{0, 1, 1, 0, 1, 0, 0, B, B, B, B}, {1, 1, 1, 0, 1, 0, 0, B, 1, 0, 1}}}

stopt :0
u     :0
snt   :0
sn   :B
rst   :B
rs    :B
g1b   :0

case : stopt=0;u=0;snt=0

{{0, 1, 0, 0, 1, 0, 0, B, B, B, B}, {0, 0, 1, 0, 0, 0, 0, B, B, B, B}}

last step input :
 {Prepend, {0, 1, 0, 0, 1, 0, 0, B, B, B, B}, {{0, 0, 1, 0, 0, 0, 0, B, B, B, B},
   {0, 1, 1, 0, 1, 0, 0, B, B, B, B}, {1, 1, 1, 0, 1, 0, 0, B, 1, 0, 1}}}

branch = stopt=0;snt=0;

out    = {{0, 1, 0, 0, 1, 1, B, B, B, B, B}, {0, 0, 1, 0, 0, 0, 0, B, B, B, B},
  {0, 1, 1, 0, 1, 0, 0, B, B, B, B}, {1, 1, 1, 0, 1, 0, 0, B, 1, 0, 1}}
```

(Debug) Out[138]//TableForm=

0	1	0	0	1	1	B	B	B	B	B
0	0	1	0	0	0	0	B	B	B	B
0	1	1	0	1	0	0	B	B	B	B
1	1	1	0	1	0	0	B	1	0	1

(Debug) In[158]:=
```
<< "wInv.ma";
X7 = BackwardVisit@X6;
TableForm@X7

F2 = wRevInit[X7];
TableForm@F2
```

```
in1 : {0, 1, 0, 0, 1, 1, B, B, B, B, B}

in2 : {#1 &, {B, B, B, B, B, B, B, B, B, B, B}, {}}

stopt :B
rst   :B
rs    :B
stop  :1
u     :0
v     :1

case : stopt=B;rs=B;stop=1;

{{0, 1, 0, 0, 1, 1, B, B, B, B, B}, {B, B, B, B, B, B, B, B, B, B, B}}

in1 : {0, 0, 1, 0, 0, 0, 0, B, B, B, B}

in2 : {Prepend, {0, 1, 0, 0, 1, 1, B, B, B, B, B}, {}}

stopt :1
rst   :B
rs    :B
stop  :0
u     :0
v     :0

case : stopt=1

{{0, 0, 1, 0, 0, 1, 0, B, B, B, B}, {0, 1, 0, 0, 1, B, B, B, B, B, B}}

in1 : {0, 1, 1, 0, 1, 0, 0, B, B, B, B}

in2 : {Prepend, {0, 0, 1, 0, 0, 1, 0, B, B, B, B}, {{0, 1, 0, 0, 1, B, B, B, B, B, B}}}

stopt :1
rst   :B
rs    :B
stop  :0
u     :0
v     :1

case : stopt=1

{{0, 1, 1, 0, 1, 1, 0, B, B, B, B}, {0, 0, 1, 0, 0, B, B, B, B, B, B}}

in1 : {1, 1, 1, 0, 1, 0, 0, B, 1, 0, 1}

in2 : {Prepend, {0, 1, 1, 0, 1, 1, 0, B, B, B, B},
  {{0, 0, 1, 0, 0, B, B, B, B, B, B}, {0, 1, 0, 0, 1, B, B, B, B, B, B}}}

stopt :1
rst   :B
rs    :B
stop  :0
u     :1
v     :1

case : stopt=1

{{1, 1, 1, 0, 1, 1, 0, B, 1, 0, 1}, {0, 1, 1, 0, 1, B, B, B, B, B, B}}

last step input :
 {Prepend, {1, 1, 1, 0, 1, 1, 0, B, 1, 0, 1}, {{0, 1, 1, 0, 1, B, B, B, B, B, B},
   {0, 0, 1, 0, 0, B, B, B, B, B, B}, {0, 1, 0, 0, 1, B, B, B, B, B, B}}}
```

(Debug) Out[160]//TableForm=

1	1	1	0	1	B	B	B	B	B	B
0	1	1	0	1	B	B	B	B	B	B
0	0	1	0	0	B	B	B	B	B	B
0	1	0	0	1	B	B	B	B	B	B

(Debug) Out[162]//TableForm=

0	1	0	0	1	B	B	B	0	0	0
0	0	1	0	0	B	B	B	0	0	0
0	1	1	0	1	B	B	B	0	0	0
1	1	1	0	1	B	B	B	0	0	0

(Debug) (Dialog) In[11]:=
```
<< "wInv.ma"; (X1 = ForwardVisit[Reverse[base]]);
```

(Debug) (Dialog) In[12]:=
```
TableForm[base]
TableForm[Reverse@X1]
```

(Debug) (Dialog) In[14]:=
```
X2 = BackwardVisit[X1];
```

(Debug) (Dialog) In[15]:=
```
TableForm[base]
TableForm[Reverse@X1]
TableForm[X2]
```

(Debug) In[58]:=
```
F0 = wRevInit[BackwardVisit@ForwardVisit@Reverse@base];
F1 = wRevInit[BackwardVisit@ForwardVisit@Reverse@F0];
F2 = wRevInit[BackwardVisit@ForwardVisit@Reverse@F1];
TableForm@F2
```

(Debug) In[88]:=
```
TableForm@base
TableForm@F0
X4 = ForwardVisit@(X3 = Reverse@F0)
TableForm@X3
TableForm@X4
```

(Debug) In[47]:=
```
<< "wInv.ma";
F1 = wRevInit@(X5 = BackwardVisit@(F0));
TableForm@F0
TableForm@X3
TableForm@X4
TableForm@X5
TableForm@F1
```

(Debug) In[77]:=
```
X7 = ForwardVisit@(X6 = Reverse@F1)
TableForm[F1]
TableForm@X7
```

```
in1 : {1, 1, 1, 0, 1, B, B, B, 0, 0, 0}

in2 : {#1 &, {B, B, B, B, B, B, B, B, B, B, B}, {}}

stopt :B
u     :1
snt   :B
sn    :B
rst   :B
rs    :B
g1b   :1

case : stopt=B;snt=B;u=1

{{1, B, 1, 0, B, 0, 0, B, 1, 0, 1}, {B, B, B, B, B, B, B, B, B, B, B}}

in1 : {0, 1, 1, 0, 1, B, B, B, 0, 0, 0}

in2 : {Prepend, {1, B, 1, 0, B, 0, 0, B, 1, 0, 1}, {}}

stopt :0
u     :0
snt   :0
sn    :B
rst   :B
rs    :B
g1b   :1

case : stopt=0;u=0;snt=0

{{0, 1, 1, 0, 1, 0, 0, B, B, B, B}, {1, B, 1, 0, B, 0, 0, B, 1, 0, 1}}

in1 : {0, 0, 1, 0, 0, B, B, B, 0, 0, 0}

in2 : {Prepend, {0, 1, 1, 0, 1, 0, 0, B, B, B, B}, {{1, B, 1, 0, B, 0, 0, B, 1, 0, 1}}}

stopt :0
u     :0
snt   :0
sn    :B
rst   :B
rs    :B
g1b   :1

case : stopt=0;u=0;snt=0

{{0, 0, 1, 0, 0, 0, 0, B, B, B, B}, {0, 1, 1, 0, 1, 0, 0, B, B, B, B}}

in1 : {0, 1, 0, 0, 1, B, B, B, 0, 0, 0}

in2 : {Prepend, {0, 0, 1, 0, 0, 0, 0, B, B, B, B},
  {{0, 1, 1, 0, 1, 0, 0, B, B, B, B}, {1, B, 1, 0, B, 0, 0, B, 1, 0, 1}}}

stopt :0
u     :0
snt   :0
sn    :B
rst   :B
rs    :B
g1b   :0

case : stopt=0;u=0;snt=0

{{0, 1, 0, 0, 1, 0, 0, B, B, B, B}, {0, 0, 1, 0, 0, 0, 0, B, B, B, B}}

last step input :
 {Prepend, {0, 1, 0, 0, 1, 0, 0, B, B, B, B}, {{0, 0, 1, 0, 0, 0, 0, B, B, B, B},
   {0, 1, 1, 0, 1, 0, 0, B, B, B, B}, {1, B, 1, 0, B, 0, 0, B, 1, 0, 1}}}

branch = stopt=0;snt=0;

out    = {{0, 1, 0, 0, 1, 1, B, B, B, B, B}, {0, 0, 1, 0, 0, 0, 0, B, B, B, B},
  {0, 1, 1, 0, 1, 0, 0, B, B, B, B}, {1, B, 1, 0, B, 0, 0, B, 1, 0, 1}}

(Debug) Out[77]= {{0, 1, 0, 0, 1, 1, B, B, B, B, B}, {0, 0, 1, 0, 0, 0, 0, B, B, B, B},
    {0, 1, 1, 0, 1, 0, 0, B, B, B, B}, {1, B, 1, 0, B, 0, 0, B, 1, 0, 1}}
```

(Debug) Out[78]//TableForm=

0	1	0	0	1	B	B	B	0	0	0
0	0	1	0	0	B	B	B	0	0	0
0	1	1	0	1	B	B	B	0	0	0
1	1	1	0	1	B	B	B	0	0	0

(Debug) Out[79]//TableForm=

0	1	0	0	1	1	B	B	B	B	B
0	0	1	0	0	0	0	B	B	B	B
0	1	1	0	1	0	0	B	B	B	B
1	B	1	0	B	0	0	B	1	0	1

(Debug) In[66]:=
```
TableForm@base
TableForm@F0

pp

p
```

(Debug) In[21]:=

```
U = {0, 1, 0, 0}
pp = {1, 1, 0, 1}
p = pp.Table[x^i, {i, 0, Length[pp] - 1}]
uu = U.Table[2^i, {i, 0, Length[U] - 1}]
TestDivisibility[p_, var_] := CoefficientList[p, var][[1]] === 0
FongBase[n_, fieldpoly_] :=
 {Reverse[IntegerDigits[n, 2, 8]].Table[x^i, {i, 0, 7}], fieldpoly, 1, 0}

DEBUG = Print;
FongStep[stato_] := Module[{u, v, g1, g2},
  (
   u = stato[[1]];
   v = stato[[2]];
   g1 = stato[[3]];
   g2 = stato[[4]];
   DEBUG["u=", u, " v=", v, " g1=", g1, " g2=", g2];
   While[TestDivisibility[u, x],
        (
         u = Collect[u / x, x];
         If[TestDivisibility[g1, x],
                  g1 = Collect[g1 / x, x],
                  g1 = Collect[PolynomialMod[(g1 + p), 2] / x, x]
         ];
       DEBUG["IN WHILE u=", u, " v=", v, " g1=", g1, " g2=", g2];

        )
   ];
   If[u =!= 1,
    (
      d1 = Exponent[u, x];
      d2 = Exponent[v, x];
      DEBUG["PRIMA IF u=", u, " v=", v, " g1=", g1, " g2=", g2];
      If[d1 < d2,
       (
        aux = u;
        u = v;
        v = aux;
        aux = g1;
        g1 = g2;
        g2 = aux;
        DEBUG[" DOPO SWAP u=", u, " v=", v, " g1=", g1, " g2=", g2];
       )];
      DEBUG[" SOMMO u=", u, " v=", v, " g1=", g1, " g2=", g2];
      u = PolynomialMod[u + v, 2];
      g1 = PolynomialMod[g1 + g2, 2];
      DEBUG[" FINALE u=", u, " v=", v, " g1=", g1, " g2=", g2];
     );
   ];
   {u, v, g1, g2}
  )
 ]
```

(Debug) In[57]:=

```
p
```

(Debug) In[33]:=

```
uu = 4
p = 1 + x + x^3
```

(Debug) In[35]:=
```
FongBase[uu, p]
TableForm@NestList[FongStep, FongBase[uu, p], 8]
```