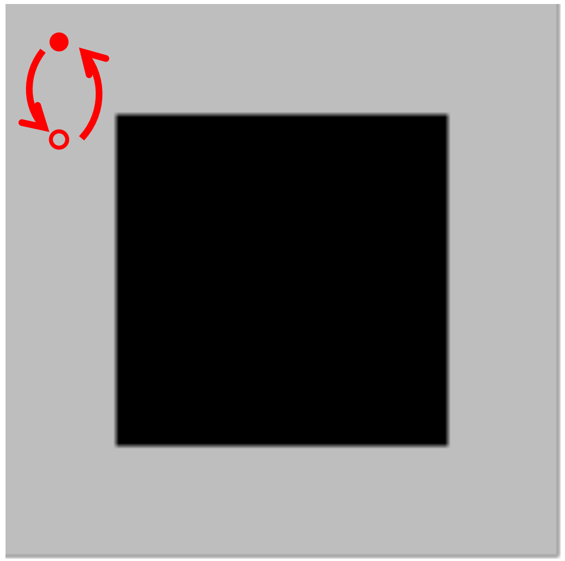
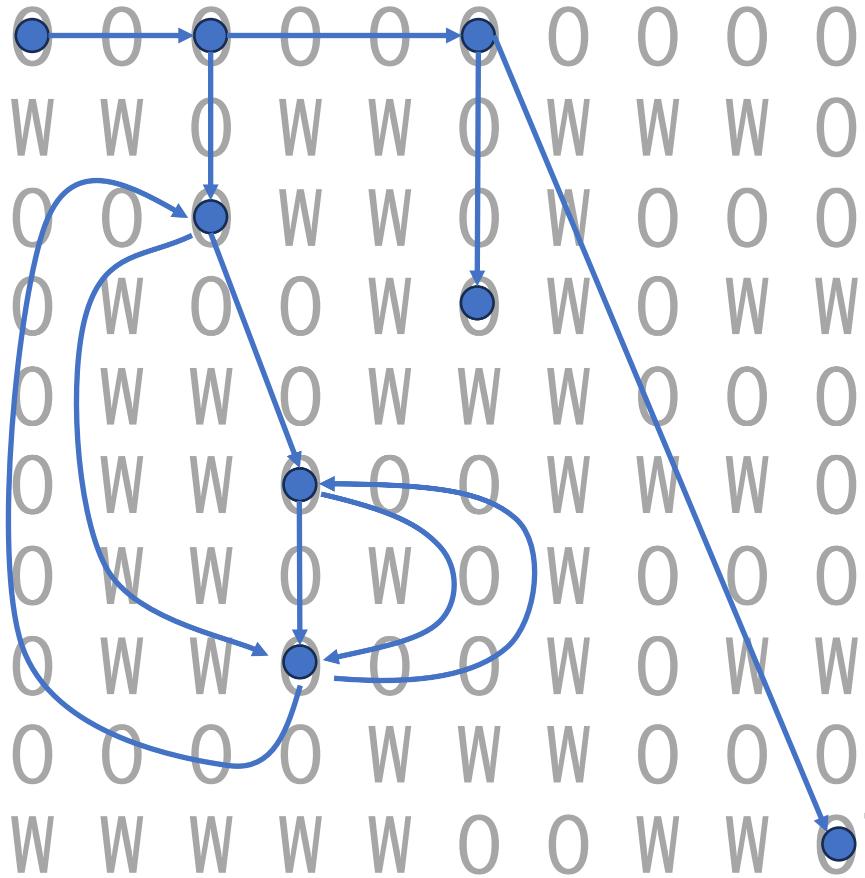
Lecture 21
mazes and graphs



```
(define M7
  (list O O O O O O O O O O
        W W O W W O W W W O
        O O O W W O W O O O
        O W O O W O W O W W
        O W W O W W W O O O
        O W W O O O W W W O
        O W W O W O W O O O
        O W W O O O W O W W
        O O O O W W W O O O
        W W W W W O O W W O))
```

The fine grained maze structure is pretty dense. Not complex really, but just dense.

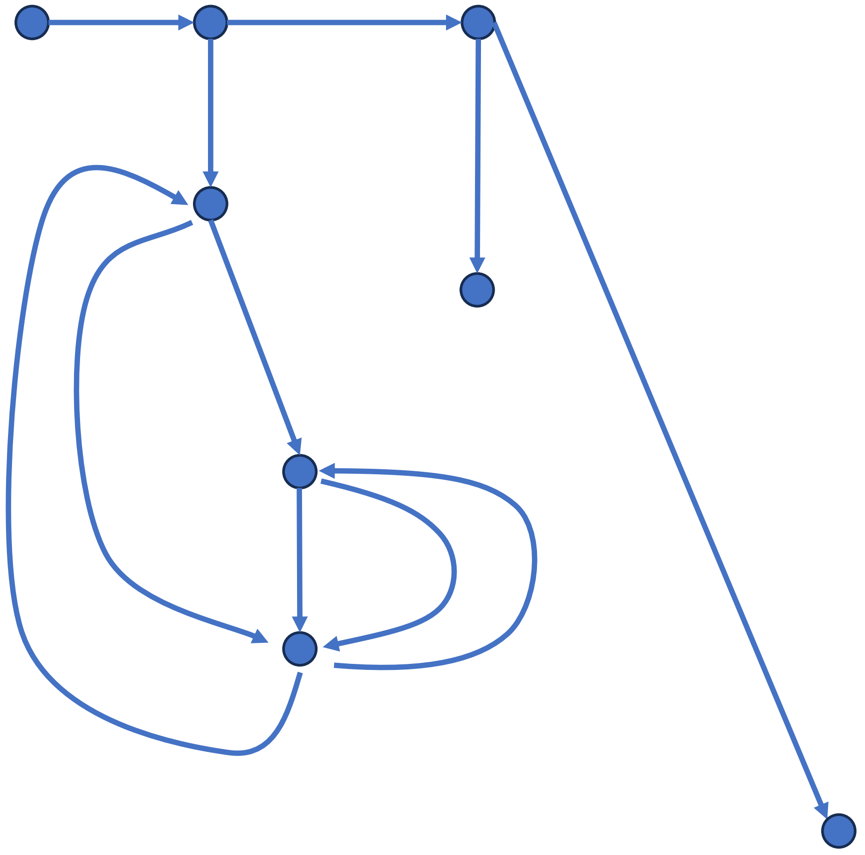
But we can simplify…



```
(define M7
  (list O O O O O O O O O O
        W W O W W O W W W O
        O O O W W O W O O O
        O W O O W O W O W W
        O W W O W W W O O O
        O W W O O O W W W O
        O W W O W O W O O O
        O W W O O O W O W W
        O O O O W W W O O O
        W W W W W O O W W O))
```

The fine grained maze structure is pretty dense. Not complex really, but just dense.

But we can see that among the dense back and forth, some points are more interesting.



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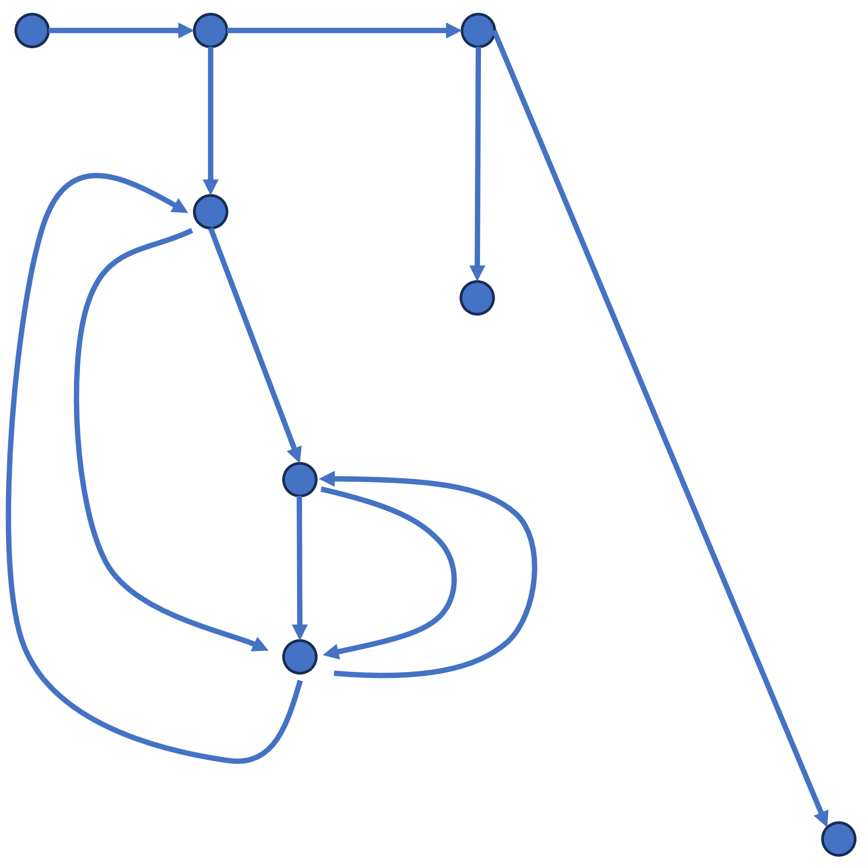
But we can see that among the dense back and forth, some points are more interesting.

Clicker time!



solvable-no-revisits?

graph: yes → path or visited required

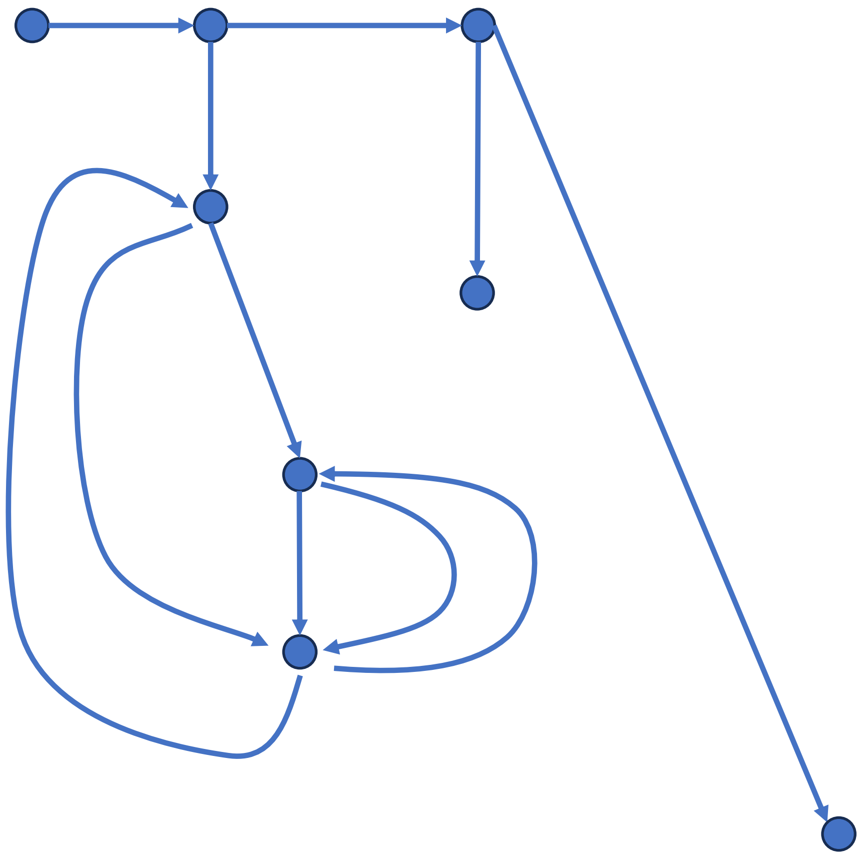
…

```
(define (solvable-no-revisits? m)
  (local [(define R (sqrt (length m)))

          ;; trivial:
          ;; reduction:
          ;; argument:

          (define (fn-for-p p p-wl visited)
            (cond [(solved? p) true]
                  [(member? p visited) (fn-for-lop p-wl visited)]
                  [else
                   (fn-for-lop (append (next-ps p) p-wl) (cons p visited))]))

          (define (fn-for-lop p-wl visited)
            (cond [(empty? p-wl) false]
                  [else
                   (fn-for-p (first p-wl) (rest p-wl) visited)]))
```



distance-from

graph: yes → path or visited required

…

```
(define (distance-from m start end)
  (local [(define R (sqrt (length m)))

          ;; trivial:
          ;; reduction:
          ;; argument:

          (define (fn-for-p p path dist)
            (cond [(equal? p end)   (distance-add1 dist)]
                 ;[(solved? p)      false]
                  [(member? p path) false]
                  [else
                   (if (equal? p start)
                       (fn-for-lop (next-ps p) (cons p path) 0)
                       (fn-for-lop (next-ps p)
                                   (cons p path)
                                   (distance-add1 dist)))]))

          (define (fn-for-lop lop path dist)
            (cond [(empty? lop) false]
                  [else
                   (local [(define try (fn-for-p (first lop) path dist))]
                     (if (not (false? try))
                         try
                         (fn-for-lop (rest lop) path dist)))]))
```