

```
glider = Matrix [[False, True, False],[False, False, True],[True, True, True]]
```

--1a)

```
state :: Matrix -> (Int, Int) -> Bool
```

```
state (Matrix mat) (x,y) = let col = mat !! x in let cell = col !! y in cell
```

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4/4

--1b)

```
nachbarn :: (Int, Int) -> Int -> [(Int, Int)]
```

```
nachbarn (x, y) dim = if ((x >= dim) || (y >= dim)) then error "ungültige Dimension"
```

```
else [(a, b) | a <- [x-1, x, x+1], b <- [y-1, y, y+1], a < dim, b < dim, a >= 0, b >= 0, (a, b) /= (x, y)]
```

7/7

--1c)

```
anzahlBelegterNachbarn :: Matrix -> (Int, Int) -> Int
```

```
anzahlBelegterNachbarn (Matrix mat) (x, y) = ichMacheDasMalRekursiv (Matrix mat) (nachbarn (x, y) (length mat))
```

```
ichMacheDasMalRekursiv _ [] = 0
```

```
ichMacheDasMalRekursiv (Matrix mat) (x:xs) = if (state (Matrix mat) x) then 1 +
```

```
ichMacheDasMalRekursiv (Matrix mat) xs else ichMacheDasMalRekursiv (Matrix mat) xs
```

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--1d)

```
zugGOL :: Matrix -> Matrix
```

```
zugGOL (Matrix mat) = (Matrix [[ nextCell (state (Matrix mat) (y, x)) (anzahlBelegterNachbarn (Matrix mat) (y, x)) | x <- [0..length mat -1]] | y <- [0..length mat -1]])
```

```
nextCell alive nachbar = if (alive) then
```

```
if (nachbar == 2 || nachbar == 3) then True else False
```

```
else if (nachbar == 3) then True else False
```

--1e)

```
zuege :: Matrix -> Int -> Matrix
```

```
zuege a 0 = a
```

```
zuege (Matrix mat) anzahl = zuege' (Matrix mat) anzahl
```

```
zuege' a 0 = a
```

```
zuege' (Matrix mat) n = zuege' (zugGOL (Matrix mat)) (n-1)
```

--1f)

```
oszilliert :: Matrix -> Bool
```

```
oszilliert (Matrix mat) = if (Matrix mat) `elem` [zuege (Matrix mat) n | n <- [1..]] then True else False
```

--2)

```
myLookup :: Eq a => a -> [(a, b)] -> Maybe b
```

```
myLookup key liste = foldr (check key) Nothing liste
```

```
check key a b = if key == (fst a) then Just (snd a) else b
```

foldl wartet die Argumente von "rechts" nach "links" aus-

Da bei einer unendlichen Liste das rechteste (= erste) Element im

Unendlichen liegt, kann keine Auswertung vollzogen werden.

~ ✓ 10/10