

# Recurrence relations

Recurrence relations are generally functions or sets that are defined recursively, as in

1.  $g(1) = 3$  and  $g(n) = 3 + g(n - 1)$  for  $n \geq 2$
2.  $A(1) = \{f : \mathbb{Z}^+ \rightarrow \mathbb{Z} \mid f(1) = 1\}$  and  
 $A(n) = A(n - 1) \cup \{f : \mathbb{Z}^+ \rightarrow \mathbb{Z} \mid f(n) = 1\}$  for  $n \geq 2$
3.  $B(1) = \{f : \mathbb{Z}^+ \rightarrow \mathbb{Z} \mid f(1) = 1\}$  and  
 $B(n) = B(n - 1) \cap \{f : \mathbb{Z}^+ \rightarrow \mathbb{Z} \mid f(n) = 1\}$  for  $n \geq 2$
4.  $C(1) = \mathbf{T}$  (i.e., True) and  $C(n) = \neg C(n - 1)$  if  $n \geq 2$ .

Questions:

- ▶ Can you find closed forms for any of these?
- ▶ Can you prove your closed form correct by induction?