

La question 4 et le début de la question 5 :

2.1.2 la règle de déduction pour la boucle repeat :

Question 5 :

Tour	i	n	m	$(i * (i-1))$
0	1	0	1	0
1	2	1	2	2
2	3	3	3	6
3	4	6	4	12
4	5	10	5	20
5	6	15	6	30

L'invariant est alors :  $\{((n+2) = (i * (i-1))) \wedge (i = n)\}$

Question 4 :

$$\frac{\{x = y + 1 - 1\} \quad i := i + 1 \quad \{x + 1 = y + (i + 1) - 1\} \quad \text{Aff} \quad \{x + 1 = y + (i + 1) - 1\} \quad x := x + 1 \quad \{x = y + (i + 1) - 1\} \quad \text{Aff}}{\{x = y + 1 - 1\} \quad i := i + 1; \quad x := x + 1; \quad \{x = y + 1 - 1\} \wedge (i = 10 + 1)\} \quad \text{Séquence}}$$

$$\frac{\{x = y\} \quad i := 1 \quad \{x = y + 1 - 1\} \quad \text{Aff} \quad \{x = y + 1 - 1\} \quad \text{Boucle} \quad \{x = y + 1 - 1\} \wedge (i = 10 + 1)\} \quad \text{Aff}}{\{x = y\} \quad \text{repeat } 10 \text{ do } x := x + 1 \quad \{x = (y + 10)\} \quad \text{Aff}}$$

$i := 11$   
 $x = y + 10$

J'ai choisi d'afficher l'affectation du i.

Ici la décoration du programme de la question 5 :

Question 5 suite :

On décore le programme :

$$\{(n=0) \wedge (m=1)\}$$

$$\{(n=0) \wedge (m=1) \wedge (i=n)\}$$

repeat 5 do

$$\{((n+2) = (i * (i-1))) \wedge (i = n)\}$$

$$\{((n+2) = ((i-1) + (i-2)))$$

$$n := n + 1;$$

$$\{((n+2) = (i * (i-1))) \wedge ((i-1) = n)\}$$

$$m := m + 1;$$

$$\{((n+2) = (i * (i-1))) \wedge (i = n)\}$$

od

$$\{(n+2) = (i * (i-1)) \wedge (i = n) \wedge (i = 5 + 1)\}$$

$$\{(n = 15) \wedge (m = 6)\}$$

Question 5 suite, arbre de preuve:

Question 5 suite suite :

$$\{(n+2) = (i-1) * (i-2)\} \wedge i = n+1 \wedge \{(n+2) = (i * (i-1)) \wedge (i-1) = n\}$$

$$\{(n+2) = (i * (i-1)) \wedge (i-1) = n\} \wedge i = n+1 \wedge \{(n+2) = (i * (i-1)) \wedge (i-1) = n\} \wedge i = n+1 \wedge \{(n+2) = (i * (i-1)) \wedge (i-1) = n\}$$

$$\{(n=0) \wedge (n=1)\} \wedge i = 1 \wedge \{(n=0) \wedge (n=1) \wedge (i=n)\} \wedge \{(n=0) \wedge (n=1) \wedge (i=n)\} \wedge \{(n+2) = (i * (i-1)) \wedge (i-1) = n\}$$

$$\{(n=0) \wedge (n=1)\} \wedge \text{repeat } 5 \text{ do } n := n+1; m := m+1 \text{ od } \{(n=1) \wedge (n=6)\}$$