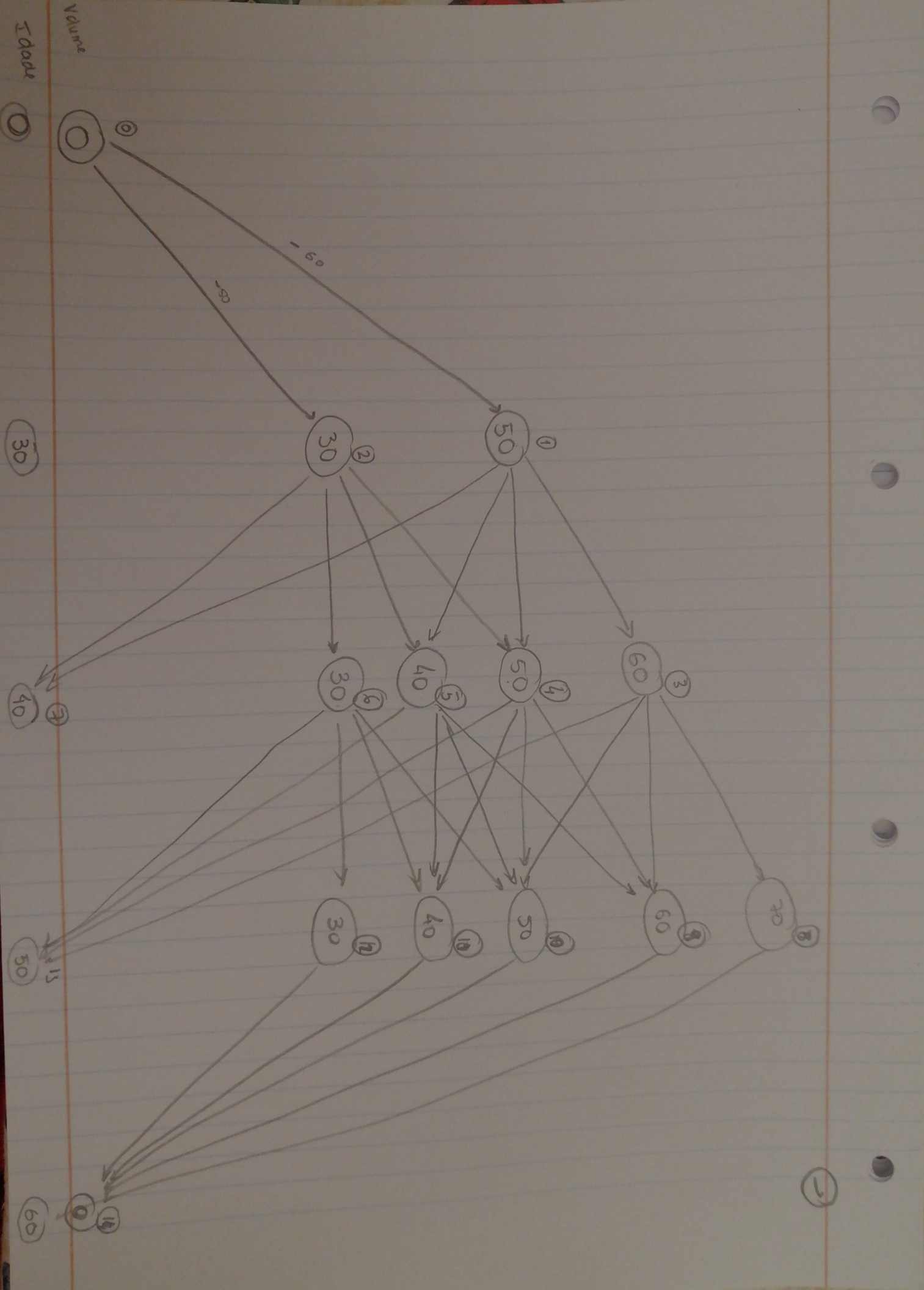




| de | taxa | volume remonido | custo | receita        | receita atualizada                        |
|----|------|-----------------|-------|----------------|-------------------------------------------|
| 0  | 1    | 0               | -60   |                |                                           |
| 0  | 2    | 0               | -50   |                |                                           |
| 1  | 3    | 0               | -     |                | 0                                         |
| 1  | 4    | 10              |       | $10 \times 32$ | $320/(1+i)^{30}$ $20 \approx 320/16 = 20$ |
| 1  | 5    | 20              |       | $20 \times 32$ | 40                                        |
| 1  | 7    | 60              |       | $60 \times 32$ | 120                                       |
| 2  | 4    | 0               |       | $0 \times 32$  | 0                                         |
| 2  | 5    | 10              |       | $10 \times 32$ | 20                                        |
| 2  | 6    | 20              |       | $20 \times 32$ | 40                                        |
| 2  | 7    | 50              |       | $50 \times 32$ | 100                                       |
| 3  | 8    | 0               |       | $0 \times 48$  | 0                                         |
| 3  | 9    | 10              |       | $10 \times 48$ | 15                                        |
| 3  | 10   | 20              |       | $20 \times 48$ | 30                                        |
| 3  | 13   | 70              |       | $70 \times 48$ | 105                                       |
| 4  | 9    | 0               |       | $0 \times 48$  | 0                                         |
| 4  | 10   | 10              |       | $10 \times 48$ | 15                                        |
| 4  | 11   | 20              |       | $20 \times 48$ | 30                                        |
| 4  | 13   | 60              |       | $60 \times 48$ | 90                                        |
| 5  | 9    | 0               |       | $0 \times 48$  | 0                                         |
| 5  | 10   | 10              |       | $10 \times 48$ | 15                                        |
| 5  | 11   | 20              |       | $20 \times 48$ | 30                                        |
| 5  | 13   | 60              |       | $60 \times 48$ | 90                                        |
| 6  | 10   | 0               |       | $0 \times 48$  | 0                                         |
| 6  | 11   | 10              |       | $10 \times 48$ | 15                                        |
| 6  | 12   | 20              |       | $20 \times 48$ | 30                                        |
| 6  | 13   | 50              |       | $50 \times 48$ | 75                                        |
| 8  | 14   | 70              |       | $70 \times 64$ | 70                                        |
| 9  | 14   | 60              |       | $60 \times 64$ | 60                                        |
| 10 | 14   | 60              |       | $60 \times 64$ | 60                                        |
| 11 | 14   | 50              |       | $50 \times 64$ | 50                                        |
| 12 | 14   | 50              | -     | $50 \times 64$ | 50                                        |

Nota:  $(1+i)^{10} = 2$   
 $(1+i)^{20} = 4$   
 $(1+i)^{30} = 16$   
 $(1+i)^{40} = 32$   
 $(1+i)^{50} = 64$

$(1+i)^{10} = 2$   
 $(1+i)^{20} = 4$   
 $(1+i)^{30} = 16$   
 $(1+i)^{40} = 32$   
 $(1+i)^{50} = 64$

# Metodo Forward

| est 1 | 0   | Max | No' ophmo |
|-------|-----|-----|-----------|
| 1     | -60 | -60 | 0         |
| 2     | -50 | -50 | 0         |

$$\text{cam. ophmo} = 0-1-7$$

$$\text{ROT40}$$

$$\text{Cam rot50} = 0-1-5-13$$

$$\text{rot 50} = 0-1-5-10-14$$

Est2

| ROT40 | 1               | 2               | Max | No' ophmo |
|-------|-----------------|-----------------|-----|-----------|
| 7     | 120+(-60)<br>60 | 100+(-50)<br>50 | 60  | 1         |
| 3     | 0+(-60)<br>-60  | /               | -60 | 1         |
| 4     | 20+(-60)<br>-40 | 0-50<br>-50     | -40 | 1         |
| 5     | 40+(-60)<br>-20 | 20+(-50)<br>-30 | -20 | 1         |
| 6     | /               | 40-50<br>(-10)  | -10 | 2         |

| est3 | 3               | 4            | 5           | 6           | Max | No' ophmo |
|------|-----------------|--------------|-------------|-------------|-----|-----------|
| 13   | 105+(-60)<br>45 | 90-40<br>50  | 90-20<br>70 | 75-10<br>65 | 70  | 5         |
| 8    | 0-60<br>-60     | /            | /           | /           | -60 | 3         |
| 9    | 15-60<br>-45    | 0-40<br>-40  | 0-20<br>-20 | /           | -20 | 5         |
| 10   | 30-60<br>-30    | 15-40<br>-25 | 15-20<br>-5 | 0-10<br>-10 | -5  | 5         |
| 11   | /               | 30-40<br>-10 | 30-20<br>10 | 15-10<br>5  | 10  | 5         |
| 12   | /               | /            | /           | 30-10<br>20 | 20  | 6         |

|    | 8           | 9           | 10         | 11          | 12          | Max | Nó |
|----|-------------|-------------|------------|-------------|-------------|-----|----|
| 14 | 70-60<br>10 | 60-20<br>40 | 60-5<br>55 | 50-10<br>40 | 50-20<br>30 | 55  | 10 |

$$\text{Caução opfmo } 40 = 60$$

$$50 = 70$$

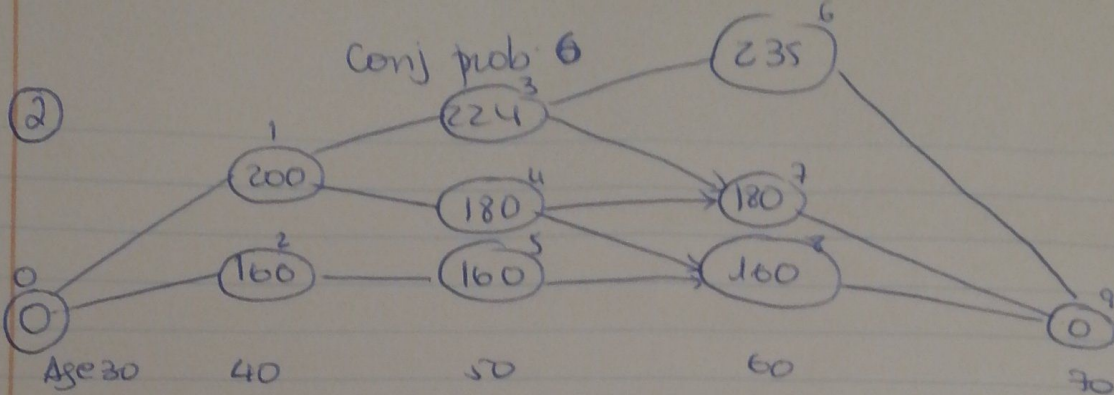
$$60 = 55$$

$$VT = \frac{60 \times (1+i)^{40}}{(1+i)^{40} - 1} = \frac{60 \times 32}{32 - 1} = 61,94$$

$$\frac{70 \times 64}{64 - 1} = 71,11$$

$$\frac{55 \times 132}{132 - 1} = 55,42$$

$$\text{Opcao opfmo} = \text{Rot } \underline{\underline{50}}$$



| from | to | ra→b |
|------|----|------|
| 0    | 1  | 0    |
| 0    | 2  | 40   |
| 1    | 3  | 0    |
| 1    | 4  | 44   |
| 2    | 5  | 28   |
| 3    | 6  | 0    |
| 3    | 7  | 55   |
| 4    | 7  | 27   |
| 4    | 8  | 47   |
| 5    | 8  | 29   |
| 6    | 9  | 246  |
| 7    | 9  | 206  |
| 8    | 9  | 185  |

Método Forward → para a frente

| est 1 | 0  | Max | no optimo |
|-------|----|-----|-----------|
| 1     | 0  | 0   | 0         |
| 2     | 40 | 40  | 0         |

| Est 2 | 1          | 2           | Max | no optimo |
|-------|------------|-------------|-----|-----------|
| 3     | 0+0<br>=0  | /           | 0   | 1         |
| 4     | 44+0<br>44 | /           | 44  | 1         |
| 5     | /          | 28+40<br>68 | 68  | 2         |

| est 3 | 3          | 4           | 5           | Max | no |
|-------|------------|-------------|-------------|-----|----|
| 6     | 0+0<br>0   | /           | /           | 0   | 3  |
| 7     | 55+0<br>55 | 27+44<br>71 | /           | 71  | 4  |
| 8     | /          | 47+44<br>91 | 29+68<br>97 | 97  | 5  |

|   | 6            | 7             | 8             | Max | no |
|---|--------------|---------------|---------------|-----|----|
| 9 | 246+0<br>246 | 206+71<br>277 | 185+97<br>282 | 282 | 8  |

camunho optimo = 0 → 2 → 5 → 8 → 9

- Desbasta até 160;  
mantem 160 mant  
160 e contra abt

Método backward ← para trás

| est4 | 9   | Max | Nº optimo |
|------|-----|-----|-----------|
| 6    | 246 | 246 | 9         |
| 7    | 206 | 206 | 9         |
| 8    | 185 | 185 | 9         |

| est3 | 6              | 7               | 8               | Max | Nº opt |
|------|----------------|-----------------|-----------------|-----|--------|
| 3    | 0 + 246<br>246 | 55 + 206<br>261 | /               | 261 | 7      |
| 4    | /              | 27 + 206<br>233 | 47 + 185<br>232 | 233 | 7      |
| 5    | /              | /               | 29 + 185<br>214 | 214 | 8      |

| est2 | 3              | 4               | 5               | Max | Nº optimo |
|------|----------------|-----------------|-----------------|-----|-----------|
| 2    | /              | /               | 28 + 214<br>242 | 242 | 5         |
| 1    | 0 + 261<br>261 | 44 + 233<br>277 | /               | 277 | 4         |

|   | 2              | 2               | Max | Nº opt |
|---|----------------|-----------------|-----|--------|
| 0 | 0 + 277<br>277 | 40 + 242<br>282 | 282 | 2      |

cam. optimo 0 - 2 - 5 - 8 - 9

Corte de papel para maximização do valor

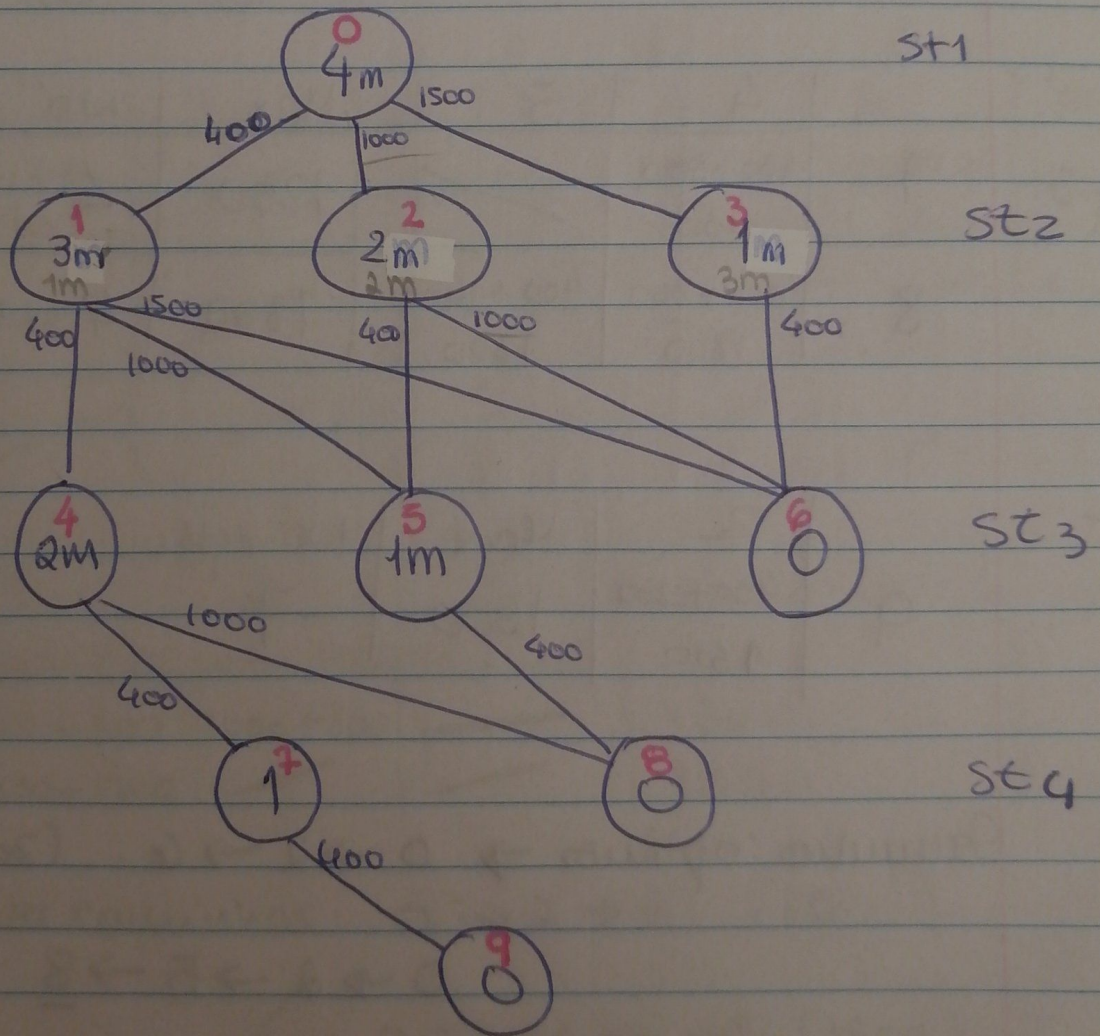
→ usag de corte de papel, product / Corte papel de diferentes tamanhos

→ cada rolo tem 4 metros de largura. Este pode ser cortado em 3 diferentes comprimentos

|            | Preço venda |
|------------|-------------|
| → 1 metro  | 400 €       |
| → 2 metros | 1000 €      |
| → 3 metros | 1500 €      |

Objetivo: max. rendimento

Valor do  
no = tamanho  
do rolo que  
sobra após  
corte



# Metodo Forward

| Est 1 |   | 0    | Max  | No' opt |
|-------|---|------|------|---------|
|       | 1 | 400  | 400  | 0       |
|       | 2 | 1000 | 1000 | 0       |
|       | 3 | 1500 | 1500 | 0       |

| Est 2 |   | 1                | 2                     | 3                     | Max  | No'    |
|-------|---|------------------|-----------------------|-----------------------|------|--------|
|       | 4 | 400+400<br>800   | <del>          </del> | <del>          </del> | 800  | 1      |
|       | 5 | 1000+400<br>1400 | 400+1000<br>1400      | <del>          </del> | 1400 | 1 ou 2 |
|       | 6 | 1500+400<br>1900 | 1000+1000<br>2000     | 400+1500<br>1900      | 2000 | 2      |

| Est 3 |   | 4                | 5                     | Max  | No'    |
|-------|---|------------------|-----------------------|------|--------|
|       | 7 | 400+800<br>1200  | <del>          </del> | 1200 | 4      |
|       | 8 | 1000+800<br>1800 | 400+1400<br>1800      | 1800 | 4 ou 5 |

| Est 4 |   | 7                | Max  | No' opt |
|-------|---|------------------|------|---------|
|       | 9 | 400+1200<br>1600 | 1600 | 7       |

Caminhos optimos  $\Rightarrow 0 \rightarrow 2 \rightarrow 6$  (2000)

$0 \rightarrow 2 \rightarrow 5 \rightarrow 8$  (1800)

$0 \rightarrow 1 \rightarrow 4 \rightarrow 7 \rightarrow 9$  (1600)

Caminho optimo c/ valor máximo 2000

$\rightarrow$  conta todo em rolos de 2 metros (2x)

# Metodo Backward

|   | 9   | Max | No |
|---|-----|-----|----|
| 7 | 400 | 400 | 9  |

|   | 7              | Max | No |
|---|----------------|-----|----|
| 4 | 400+400<br>800 | 800 | 7  |

|   | 8    | Max  | No |
|---|------|------|----|
| 4 | 1000 | 1000 | 8  |
| 5 | 400  | 400  | 8  |

|   | 6    | Max  | No |
|---|------|------|----|
| 1 | 1500 | 1500 | 6  |
| 2 | 1000 | 1000 | 6  |
| 3 | 400  | 400  | 6  |

|   | 4               | 5 | Max  | No | 4                | 5                 | Max  | No     |
|---|-----------------|---|------|----|------------------|-------------------|------|--------|
| 1 | 400+800<br>1200 | / | 1200 | 4  | 400+1000<br>1400 | 1000+1000<br>1400 | 1400 | 4 ou 5 |
| 2 | /               | / | /    | /  | /                | 400+400<br>800    | 800  | 5      |
| 3 | /               | / | /    | /  | /                | /                 | /    | /      |

|   | 1 | 2                | 3                 | Max            | No opt |
|---|---|------------------|-------------------|----------------|--------|
| 6 | 0 | 400+1500<br>1900 | 1000+1000<br>2000 | 500+400<br>900 | 2      |
| 8 | 0 | 400+1000<br>1400 | 1000+800<br>1800  | /              | 2      |
| 9 | 0 | 400+1200<br>1600 | /                 | 1600           | 1      |

melhores caminhos  $0 \rightarrow 2 \rightarrow 6$  (2000)

$0 \rightarrow 2 \rightarrow 5 \rightarrow 8$  (1800)

(Ótimo)  $0 \rightarrow 1 \rightarrow 4 \rightarrow 7 \rightarrow 9$  (1600)

(conta o nó de 4 metros, a 1ª x 2m e o de 2 metros e a 2ª vez usa conta e fica com 2m.