

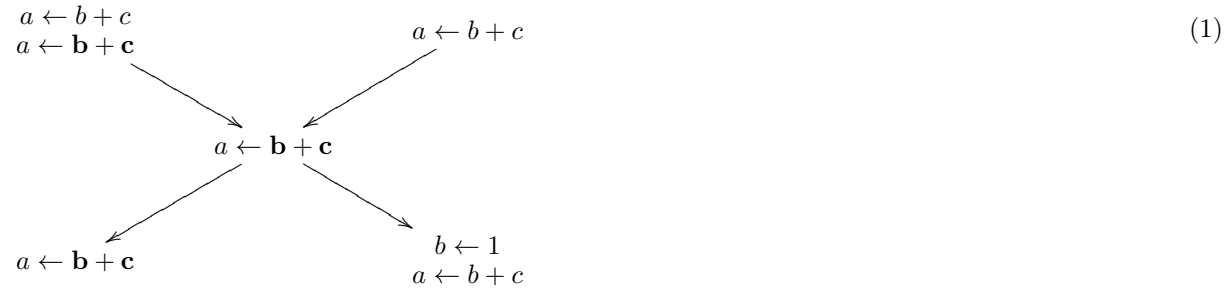
# 1 Eliminação de Redundâncias Parciais

## 1.1 Expressão Redundante

Uma expressão é *redundante* no ponto  $p$  se em cada caminho até  $p$ :

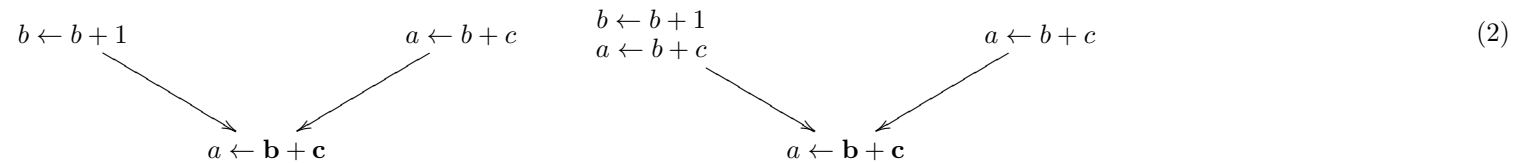
1. Ela é avaliada antes de alcançar  $p$ , e
2. Nenhum de seus operandos constituintes é redefinido antes de  $p$ .

Por exemplo, na Equação 1, as ocorrências de expressões em negrito são redundantes.



Uma expressão é *parcialmente redundante* no ponto  $p$  se ela é redundante ao longo de alguns caminhos, mas não todos, até  $p$ .

Por exemplo, na Equação 2, a expressão  $b + c$  em negrito no diagrama da esquerda é parcialmente redundante. A inserção de uma cópia de  $b + c$  depois da definição de  $b$  pode tornar uma expressão parcialmente redundante em uma totalmente redundante como mostra o diagrama da direita.



	ENTRY	$B_1$	$B_2$	$B_3$	$B_4$	$B_5$	$B_6$	$B_7$	$B_8$	$B_9$	
e_gen	{00000000}	{00000000}	{10000000}	{01000000}	{00100000}	{00001000}	{00000100}	{00000000}	{00000000}	{00000000}	{00000000}
e_kill	{00000000}	{01101101}	{00010010}	{01100001}	{00010000}	{00001101}	{00000010}	{00000000}	{00000000}	{00000000}	{00000000}
anticipated_out	{10000000}	{11001000}	{11001000}	{11101000}	{11001000}	{11001100}	{11001000}	{11001000}	{00000000}	{00000000}	{00000000}
anticipated_in	{10000000}	{10000000}	{11001000}	{11001000}	{11101000}	{11001000}	{11001100}	{11001000}	{00000000}	{00000000}	{00000000}
available_in	{00000000}	{00000000}	{10000000}	{11001000}	{10001000}	{11001000}	{11000000}	{11001100}	{11111111}	{11111111}	{11111111}
available_out	{00000000}	{10000000}	{11001000}	{10001000}	{11101000}	{11000000}	{11001100}	{11001100}	{11111111}	{11111111}	{11111111}
earliest	{10000000}	{10000000}	{01001000}	{00000000}	{01100000}	{00000000}	{00001100}	{00000000}	{00000000}	{00000000}	{00000000}
postponable_in	{00000000}	{00000000}	{10000000}	{01001000}	{00001000}	{01001000}	{01000000}	{01001000}	{11111111}	{11111111}	{11111111}
postponable_out	{00000000}	{10000000}	{01001000}	{00001000}	{01001000}	{01000000}	{01001000}	{01001000}	{11111111}	{11111111}	{11111111}
latest	{00000000}	{00000000}	{10000000}	{01000000}	{00100000}	{00001000}	{00000100}	{00000000}	{00000000}	{00000000}	{00000000}
used_out	{00000000}	{00000000}	{00000000}	{00000000}	{00000000}	{00000000}	{00000000}	{00000000}	{00000000}	{00000000}	{00000000}
used_in	{00000000}	{00000000}	{00000000}	{00000000}	{00000000}	{00000000}	{00000000}	{00000000}	{00000000}	{00000000}	{00000000}
cond_1	{00000000}	{00000000}	{00000000}	{00000000}	{00000000}	{00000000}	{00000000}	{00000000}	{00000000}	{00000000}	{00000000}
cond_2	{00000000}	{00000000}	{00000000}	{00000000}	{00000000}	{00000000}	{00000000}	{00000000}	{00000000}	{00000000}	{00000000}

Table 1: Eliminação de Redundâncias Parciais —  $((*, 4, n), (++, i), (*, 4, i), (<, t_{10}, v), (--, j), (*, 4, j), (>, t_{12}, v), (>=, i, j))$

	-2147483648	0	2	4	5	8	9	12	17	13	4	4	4	8	8	21
-2147483648	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0
12	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

0	$b := 4$	@0:	<i>nop</i>	@0:	<i>nop</i>	@0:	<i>nop</i>	@0:	<i>nop</i>
1	$a := b + c$	@1:	$b := 4$	@1:	$b := 4$	@1:	$b := 4$	@1:	$b := 4$
2	$d := a * b$		$a := b + c$		$a := b + c$	@2:	$t_{10} := b + c$	@2:	$t_{10} := 4 + c$
3	<i>if 1 goto 6</i>		$d := a * b$		$d := a * b$		$a := t_{10}$		$a := t_{10}$
4	$b := a - c$		<i>if 1 goto @3</i>		<i>if 1 goto @9</i>	@3:	$t_{11} := a * b$	@3:	$t_{11} := a * 4$
5	<i>goto 20</i>	@2:	$b := a - c$	@2:	$b := a - c$		$d := t_{11}$		$d := t_{11}$
6	$c := b + c$		<i>goto @8</i>		<i>goto @15</i>		<i>if 1 goto @13</i>		<i>if 1 goto @6</i>
7	<i>if 1 goto 12</i>	@3:	$c := b + c$	@9:		@4:	$t_{12} := a - c$	@4:	$t_{12} := a - c$
8	$c := a * b$		<i>if 1 goto @5</i>	@10:			$b := t_{12}$		$b := t_{12}$
9	$t_5 := a - b$	@4:	$c := a * b$	@3:	$c := b + c$		<i>goto @19</i>		<i>goto @18</i>
10	<i>param t<sub>5</sub></i>		$t_5 := a - b$		<i>if 1 goto @11</i>	@13:		@6:	
11	<i>goto 17</i>		<i>param t<sub>5</sub></i>	@4:	$c := a * b$	@14:		@7:	
12	$d := a + b$		<i>goto @7</i>		$t_5 := a - b$	@5:	$c := t_{10}$	@5:	$c := t_{10}$
13	<i>goto 14</i>	@5:	$d := a + b$		<i>param t<sub>5</sub></i>	@6:	<i>if 1 goto @15</i>	@8:	<i>if 1 goto @11</i>
14	$t_6 := b + c$		<i>goto @6</i>		<i>goto @13</i>	@7:	$c := t_{11}$	@9:	$c := t_{11}$
15	<i>param t<sub>6</sub></i>	@6:	$t_6 := b + c$	@11:			$t_5 := a - b$		$t_5 := a - 4$
16	<i>if 1 goto 12</i>		<i>param t<sub>6</sub></i>	@12:			<i>param t<sub>5</sub></i>		<i>param t<sub>5</sub></i>
17	$t_7 := a + b$		<i>if 1 goto @5</i>	@5:	$d := a + b$		<i>goto @17</i>		<i>goto @15</i>
18	<i>param t<sub>7</sub></i>	@7:	$t_7 := a + b$		<i>goto @6</i>	@15:		@11:	
19	<i>if 1 goto 6</i>		<i>param t<sub>7</sub></i>	@6:	$t_6 := b + c$	@16:		@12:	
20	$t_8 := a - c$		<i>if 1 goto @3</i>		<i>param t<sub>6</sub></i>	@8:	$d := t_{14}$	@10:	$d := t_{14}$
21	<i>param t<sub>8</sub></i>	@8:	$t_8 := a - c$		<i>if 1 goto @12</i>	@9:	<i>goto @9</i>		<i>goto @13</i>
22	$t_9 := b + c$		<i>param t<sub>8</sub></i>	@13:			$t_6 := t_{10}$	@13:	$t_6 := t_{10}$
23	<i>param t<sub>9</sub></i>		$t_9 := b + c$	@14:			<i>param t<sub>6</sub></i>		<i>param t<sub>6</sub></i>
			<i>param t<sub>9</sub></i>	@7:	$t_7 := a + b$		<i>if 1 goto @16</i>		<i>if 1 goto @12</i>
					<i>param t<sub>7</sub></i>	@17:		@15:	
					<i>if 1 goto @10</i>	@18:		@16:	
		@15:				@10:	$t_7 := t_{14}$	@14:	$t_7 := t_{14}$
		@16:					<i>param t<sub>7</sub></i>		<i>param t<sub>7</sub></i>
		@8:	$t_8 := a - c$				<i>if 1 goto @14</i>		<i>if 1 goto @7</i>
			<i>param t<sub>8</sub></i>	@19:				@18:	
			$t_9 := b + c$	@20:				@19:	
			<i>param t<sub>9</sub></i>	@11:	$t_8 := t_{12}$			@17:	$t_8 := t_{12}$
					<i>param t<sub>8</sub></i>				<i>param t<sub>8</sub></i>
				@12:	$t_9 := t_{10}$			@20:	$t_9 := t_{10}$
					<i>param t<sub>9</sub></i>				<i>param t<sub>9</sub></i>