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EC Examen de Problemes

Exercici 1 (Ex. Parcial 2013-2014 Q1)

```
Tradueix a llenguatge assemblador MIPS la subrutina func1:
```

```
short func2(short a, char *b, short *c);
short func1 (int x, short *y) {
  char V1[7];
  short V2[7];
  short res;
  restfunc2(*y,&V1[x],V2);
  if (x>0)
```

Exercici 2

res++; return res+(*y)

Donades les següents declaracions en C (on N és una constant):

Tradueix a MIPS les següents sentències, suposant que pertanyen a la funció func:

```
a) B[i][3] = 0;
```

- b) B[i][j] = 0;
- c) for (i=0; i<N; i++) //utilitza accés sequencial B[3][i] = 0;
- d) for (i=0; i<N; i++) //utilitza accés sequencial B[i][i] = 0;
- e) for (i=0; i<N; i++) //utilitza accés seqüencial B[i][N-1-i] = 0;

Exercici 3 (Ex. Final 2011-2012 Q2)

Considera el següent programa

```
int v[20],m[20][20];
main() {
   int i;
   for (i=19; i>=0; i--)
      v[i] = m[19-i][i];
}
```

Tradueix el programa principal a llenguatge assemblador MIPS. Només superaran aquesta pregunta aquelles solucions en què cada iteració del bucle tingui 7 o menys línies de codi.

addic sto, sao, 12 # 63[0][5] (12=3+4) li \$t7, N=4 #=1=20 mult \$t1, \$t7 #=1=10 mult \$t1, \$t7 #=1=10 mult \$t1, \$t7 #=1=10 mult \$t1, \$t7 #=1=10 mult \$t2, \$t7 #=1=10 b) B[1][1]=0; li \$t7, N=4 #N=10 mult \$t3, \$t7 #1=10 mult \$t3, \$t7 #1=10 li \$t7, N=4 #N=10 mult \$t3, \$t7 #1=10 mult \$t3, \$t7 #1=10 li \$t7, N=4 #N=10 mult \$t3, \$t7 #1=10 li \$t3, \$t7 #1=10 li \$t3, \$t7 #1=10 mult \$t3, \$t7 #1=10 li \$t4, N=4 #N=10 mult \$t3, \$t7 #1=10 li \$t7, N=4 #N=10 mult \$t3, \$t7 #1=10 mult \$t3, \$t7 #1=10 li \$t7, N=4 #N=10 mult \$t4, \$t0, \$t0, \$t0 #1 M=10 mult \$t4, \$t0, \$t0, \$t0 #1 M=10 mult \$t4, \$t0, \$t0, \$t0 #1 M=10 mult \$t4, \$t0, \$t0 #1 M=10 mult \$t1, \$t0, \$t0 #1 M=10 mult \$t1, \$t0, \$t0 #1 M=10 mult \$t0, \$t0, \$t0 #1 M=10 mul	Ex 28	
## \$47, N + 4	a) BELIZE3Z = 0	
## \$47, N + 4	addui sto sao 12 # (Bro7537 (12=3+4)	
mote \$t3, \$t7 # 4 N + 4 mflo \$t5 sw \$t20, 0(\$t0) # BLITERT = 0 b) BLITET = 0, li \$t7, Nny #N=10 mult \$t3, \$t7 # 4 N + 4 sw \$t20, 0(\$t0) # BLITERT = 0 li \$t7, Nny #N=10 mult \$t3, \$t7 # 4 N + 4 sw \$t2, \$t7, \$t7, \$t7 # 4 N + 4 sw \$t2, \$t7, \$t7, \$t7 # 4 N + 4 sw \$t20, \$0, \$00, \$t1 # B-11 N + 4 sw \$t20, \$0, \$00, \$t2 # B-11 N + 4 sw \$t20, \$0, \$00, \$t2 # B-11 N + 4 cc) li \$t7, \$10, \$4 # B-11 N + 4 cc) li \$t7, \$10, \$4 # B-11 N + 4 li \$t0, \$00, \$00, \$t7 # B-11 N + 4 li \$t0, \$00, \$00, \$t7 # B-11 N + 4 li \$t0, \$00, \$00, \$t7 # B-11 N + 4 li \$t0, \$00, \$00, \$00, \$00, \$00, \$00, \$00,	li st7, N*4 # N=10	
MFLO \$t0, \$t0, \$t1 # B+1+N+4+3+4 SW \$200, O(\$t0) # BL1][3] = 0 b) BL12[J] = 0; li \$t7, NAY #N=10 mylt \$t2, \$t7 #1+N+4 > mylo \$t1 SU \$t2, \$t2, \$t2, \$t2 #1+1 > mylo \$t1 SU \$t2, \$t2, \$t2, \$t2 #1+1 > mylo \$t1 SU \$t2, \$t2, \$t2, \$t2 #1+1 > mylo \$t1 SU \$t2, \$t2, \$t2, \$t2 #1+1 > mylo \$t1 SU \$t2, \$t2, \$t2, \$t2 #1+1 > mylo \$t1 SU \$t2, \$t2, \$t2, \$t2 #1+1 > mylo \$t1 SU \$t2, \$t2, \$t2, \$t2 #1+1 > mylo \$t1 SU \$t2, \$t2, \$t2, \$t2 #1+1 > mylo \$t1 SU \$t2, \$t2, \$t2, \$t2 #1+1 > mylo \$t1 SU \$t2, \$t2, \$t2, \$t2 #1+1 > mylo \$t2 C) Li \$t1, \$t1, \$t1, \$t2, \$t2 #1 & 68[3][1] SU \$t2, \$t2, \$t0, \$t0 #1 & 68[3][1] Beq \$t2, \$t2, \$t0, \$t0 #1 & 68[3][1] Beq \$t2, \$t2, \$t0, \$t0 #1 & 68[3][1] C) STRIDER BL11][1] * B+1+1+1+1 + 1+1 > mylo \$t2 C) STRIDER BL11][1] * B+1+1+1+1 + 1+1 > mylo \$t2 C) STRIDER BL11][1] * B+1+1+1+1 + 1+1 > mylo \$t2 C) STRIDER BL11][1] * B+1+1+1+1+1		
SU \$200, O(\$to) # BLIJE3] = 0 b) BLIJEJJ = 0; li \$t7, NNY #N=10 myt \$t4, \$t7 # in NYY mflo \$t2 \$li \$t7, NNY #N=10 myt \$t4, \$t7 # in NYY mflo \$t2 \$li \$t7, \$t2, \$t7 # in NYY mflo \$t2 \$li \$t2, \$t2, \$t7 # in NYY mflo \$t2 addu \$a0, \$a0, \$t2 # Brinnyy + j44 su \$200, \$00, \$t2 # Brinnyy + j44 su \$200, \$00, \$t7 # 68[5][0] actu \$a0, \$a0, \$t7 # 68[5][0] actu \$a0, \$a0, \$t7 # 68[5][0] actu \$a0, \$a0, \$t7 # 68[5][0] beg \$t1, \$t20, \$1 for su \$200, \$00, \$1 # BBIJE15] b for fi for: d) \$TRIDES BLIANTINI - K* in NY in X + i		
b) BEIJEJJ = 0; li st7, N=4 #N=10 mult st2, st7 #1=4 + N+4 > mflo st2 Sil st2, st2, zt2, 2 #J+4 + mflo st2 sil st2, st2, st2, 2 #J+4 + mflo st2 schu soo, soo, st2 # Brinn+4 + J+4 + mflo st2 c) li st0,0 #i		
## \$\frac{1}{2} \text{ \frac{1}{2} \frac	Sw \$200,0(\$to) # B[i][3] = 0.	
milt sta, st7 # 4 + N + 4 mflo sta SI St2, st2, st2, 2 # 7 + 4 M ft 4 + N + 4 addu sao, sao, st2 # B+ 4 N + 4 addu sao, sao, st2 # B+ 4 N + 4 su st20, c (sao) # BE (si) = 0 c) si st0, 0 # 4 codu sao, sao, st7 # 68 [s][a] for 8 st4, st0, sao, st7 # 68 [s][a] for 8 st4, st0, sao, st7 # 68 [s][a] beo, st, szoo, fi. for sw szeo, o (sao) beo, st2, szoo, fi. for sw szeo, o (sao) beo, st2, szoo, sao, y # B B B S I I I I I I I I I I I I I I I I	b) BEiZEjZ = 0;	
milt sta, st7 # 4 + N + 4 mflo sta SI St2, st2, st2, 2 # 7 + 4 M ft 4 + N + 4 addu sao, sao, st2 # B+ 4 N + 4 addu sao, sao, st2 # B+ 4 N + 4 su st20, c (sao) # BE (si) = 0 c) si st0, 0 # 4 codu sao, sao, st7 # 68 [s][a] for 8 st4, st0, sao, st7 # 68 [s][a] for 8 st4, st0, sao, st7 # 68 [s][a] beo, st, szoo, fi. for sw szeo, o (sao) beo, st2, szoo, fi. for sw szeo, o (sao) beo, st2, szoo, sao, y # B B B S I I I I I I I I I I I I I I I I	0: 4+7 174 #1=10	
actu sao, sao, st2 # B+ 4N+4 actu sao, soo, st2 # Bran+4+ 144. Su szero, a (soo) # BE (st2) = 0 C) Li sto, O # 2 Extr. 3+N+4 # 420 (BB3101) actu sao, sao, st7 # BBE (s) cols sta, sto, so # (c) beg st1, szero, -(f-for) sw szero, a (soo), 4 # BBE31E + 2] b for fi for: d) STRIDES BE (s) IT (11) = B+ 2+ 2+ 2 + 2 + 2 + 4 + 4 + 4 + 4 + 4 +	mult the state of the state	
actu sao, sao, st2 # B+ 4N+4 actu sao, soo, st2 # Bran+4+ 144. Su szero, a (soo) # BE (st2) = 0 C) Li sto, O # 2 Extr. 3+N+4 # 420 (BB3101) actu sao, sao, st7 # BBE (s) cols sta, sto, so # (c) beg st1, szero, -(f-for) sw szero, a (soo), 4 # BBE31E + 2] b for fi for: d) STRIDES BE (s) IT (11) = B+ 2+ 2+ 2 + 2 + 2 + 4 + 4 + 4 + 4 + 4 +	500 st2, st2 2 # 14 14 11 > mflo st2	
acidu 300, 500, 512 # Brinn+4+1644. Su \$200, 0 (500) # BEIJEJZ = 0. C) Li \$40,0 #i		
Su 5200, 0 (500) # BLIJEJOO C) Li \$t0,0 #i		
Li \$t0,0 #i		
Li st7, 3+N+4 # 120 ((BESITICS)) actu sao, sao, st7 # 6BESITO) for 8 st1 st1, sto, so # i x N. beg st1, szeo, fi-for: sw szero, o(sao) b for fi for: d) STRIDER BELLISTITIS & + 1+N+ + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1		
actic \$40, \$40, \$00 \$t? # 6355] [5] Sti \$41, \$t0, \$0 # i		
Sti \$t1, \$t0, \$t0 # i < N. Sti \$t1, \$t20, -fi-for SW \$t20, 0(\$a0) SW \$t20, \$00, \$00, \$4 # & \$C\$\$\text{SL}\$\text{List}\$ b for -fi-for: d) \$TRIDES \$C\$\text{List}\$\text{List}\$ % \$\text{List}\$\text{List}\$ % \$\text{List}\$\text{List}\$ \text{Vinture} \$\text{Sti}\$\text{List}\$ \$\text{List}\$\text{List}\$ \$\text{List}\$ \$List	li \$t7, 3+N+4 # 120 (BB[3][0])	
beg \$\frac{\pmath{\text{tr}}}{200}, \frac{\frac}		
beg \$\frac{\pmath{\text{tr}}}{200}, \frac{\frac}		100
See Seero, O (Saa) October 400, 500, 4 # & BESTETA b for -fi-for: C) STRIDER BEITITITI = B+ int + is 1 + u + is + 1 Who years BEITITI = B+ int + is 1 Who years When years Li sto, 0 For 8 Set is sta, sto, so # is n Exp sts, stero, end for Sw seero, o (saa) # BEITETT = 0 Code soo, saa, sto # (BEITATE I + 1) B-for 8 End for 8 End for 8 End for 8 End for 8 Estimate is = (B+ int + this - 1) N a elements Li sto, u + (N-1) # 36 Li sto, u + (N-1) # 36 Sou stero, o (saa) Li sto, o (saa) Li sto, o (saa) Li sto, o (saa) Sou stero, o (saa) Li sto, o (saa) Li sto, o (saa) Li sto, o (saa) Sou stero, o (saa) Li sto, o (saa) Li sto, o (saa) Li sto, o (saa) Sou stero, o (saa) Li sto, o (saa)		2
b for _fi_for: d) STRIDES BLIGHTLITE & + in NT + is 1 + 1	Sw 972ero, O(800)	
d) STRIDER BEIGITIFIT & K+ ink+ is 1 kn + is + 1 kn +	addus \$00,500,4 # & BE3][i+5]	
d) STRIDES BLIGHTLING & AND + 2 + 1 N+2 elements BLITTIT = B+2+N+2 LIST, 4+(N+1) # 44 LISTO, 0 LOTS SILLI STA, STO, 20 # 2 < N BEQ STA, STO, 20 # 1 < N BEQ STA, STO, 20 # BELIZEIJEO COCK SCO, (SAO) # BELIZEIJEO COCK SCO, STAO, STA # BELIXIE(112) D-FOTS END FOTS END STRIDES BLIGHTLING (STAN) + N+2 - 1) N 1 elements E) STACE & BELIXIN-1 i = (B+2+N+1+N+2+N+2+N+2+N+2+N+2+N+2+N+2+N+2+N		
li St7, 4*(N+1) # 44 li St0, 0 for8 Stri St1, \$t0, \$0 # i < N beq \$t3, \$200, end for. SW \$200, 0(\$a0) # BEIJEIJ = 0 addu \$00,\$a0, \$t7 # BEIJEIJ = 0 b for \$ end for 8 fBEIJEN-3-iJ = -(B+in+1+1-1) N. 1 elements e) Streed & [BEIHJEN-3-i-3] = B+i+N+3+N+1+1-2 4(N 1) bytes li \$t7, 4*(N-1) # 36 addui \$a0, \$a0, 36 #9+4 (BBIJE) actu \$a0, \$a0, \$t7 # BEIHJEN-1 + li \$t6,0 for 8 Slti \$t1, \$t0, \$0# i < 10	-fi-for:	
li stt, 44 (N+2) # 44 li sto, 0 for 8 Shti sta, \$t0, \$0 # i < N beg sta, \$720, 20d for sw \$720, 0 (\$a0) # BTIJTIJ=0 ackle \$20, \$20, \$40, \$57 # CBTITTILI+1) b-for 8 end-for 8 end-for 8 (BTITN-5-1] = -(B+i+N+1+N+2-1) N & elements e) Strick & (BTI+JTN-5-1-\$\frac{1}{2} = B+i+N+2+N+2+2 \right) 4(N 1) bytes li \$t7, 4+(N-1) # 36 ackle \$a0, \$a0, \$36 # 9 + 4 (BBDT9) \ ackle \$ackle \$ac, \$50, \$\$\$ \$\$ \$\$ \$\$ for 8 sti \$t6,0 \ -for 8 Siti \$t5, \$t0, \$00 # i < 10	d) STRIDES BLITITITITITE S+ INN+ & J+N+ &	
li sto, 0 -for 8 Shti sta, sto, 20 # i < N beq sti, 12ero, end for. SW \$2ero, 0(\$aa) # BEIJEIJ = 0 addu \$00,\$ao, \$t7 # & BEIHDEHT b-for 8 -end-for 8 -end-for 8 BIHN-2-i-\$J = (B+i+N+N+3-1) N 1 elements e) Stock & (BEHDEN-5-i-\$J = B+i+N+3+N+N+1-2) 4(N 1) bytes. li st7, 4+(N-1) # 36 addui \$ao, \$ao, 36 #9+4 (BBDET) addu \$ao, \$ao, \$t7 # & BEHDEN-1 + li \$t6,0 -for 8 Slti \$t3, \$t0, \$0# i < 10	이 선생님은 상태를 보면 있다면 되었다. 이 그리고 아이를 하면 하는데 이 사람들이 되었다. 그 그리고 아이를 보는데 그래요? 그리고 있는데 그리고 있는데 그리고 있는데 그리고 있다고 있다.	J4N+4 bytes.
Solve Sta, \$t0, 30 # i < N beg \$t3, \$200, end for. SW \$200, 0(\$a0) # BTiJTiJ=0 addu \$00,\$a0,\$t7 # BBTi+DTi+1J b for \$ end for 8 end for 8 (BTiJTN-3-iJ=-(B+i+N+1+N+3-1) N.3 elements e) Stack & (BTi+JTN-5-i-3)=B+i+N+3+N+1+J+N+1+		
Set \$\frac{1}{2} \text{\$\frac{1}{2} \text{\$\frac{1} \text{\$\frac{1} \text{\$\frac{1} \text{\$\frac{1} \text{\$\frac{1} \$\fra		
beq \$t1, (7200, end for. SW \$200, 0(\$a0) #BTiJII] = 0 Oddu \$00, \$00, \$t7 # BEILITUIL (+1) b for \$ end for \$ End for \$ (BTIJIN-1-1] = -(B+1+N+N+1-1) N.1 elements e) Stock \$ (BTIHJIN-1-1-1) = B+1+N+1+N+1-2 4(N 1) bytes li \$t7, 4+(N-1) #36 adduce \$00, \$00, 36 #9+4 (BBTOTO) addu \$00, \$00, \$t7 # BEIHJIEN-1 + li \$t6,0 for 8 SItie \$t1, \$t0, \$0# i (10)		
SW \$200,0(\$a0) # BTIJEIJ=0 addu \$00,\$a0,\$t7 # BBEITEIJEIJ=0 b_for\$ end_for8 BEIJEN-3-iJ=-(B+i+N+N+3-1) N s elements e) Stude: [BTI+IJEN-5-i-5]=B+i+N+3+N+1+1-2] 4(N 1) bytes li \$t7,4*(N-1) # 36 addui \$a0,\$a0,35 #9+4 (BBDJ9) addu \$a0,\$a0,\$t7 # BBEI+IJEN-1 + li \$t6,0 for8 SIti \$t3,\$t0,\$0# i(0)		
0ddu 500,500,517 # (BTi+1) [i+1) b_for \$ _end_for 8 _end_for 8 (BTi) IN-3-i] = -(B+i*N+N+5-1) N 1 elements e) Stoe & 3 (BTi+1) IN-5-i-5] = B+i*N+3*N+N+1-2) 4(N 1) bytes li \$t7, 4*(N-1) # 36	5(4) \$200 C(500) #BTITTITE	
b-for8 -end-for8 -end-for8 -end-for8 BEIJEN-3-i] = -(B+i+N+N+3-1) N -3 elements e) Stock & (BEI+I)EN-5-i-5] = B+i+N+3+N+N-1-2) 4(N -3) bytes li st7, 4*(N-1) #36 adui sao, 5ao, 36 #9+4 (BBDJG) adu sac, 5ao, 5t7 # BBEI+I]EN-1 + li st6,0 -for8 -for8 -slti st3, sto, 20 # i < 10	000 500, 500, 5+7 # (BTi+07 Ti+1)	
-end-for8		
BTIJEN-3-1] = - (B+i+N+1+N+3-1) N 1 elements Stock & BTI+1] [N-5-1-5] = B+i+N+1+N+1+N+1-2) 4(N 1) bytes Li st7, 4+(N-1) # 36		54 8 8
e) Stoode & [BTI+1] [N-5-1-5] = B+4+N+1+N+1-7-2] 4(N 1) bytes. li st7, 4+(N-1) # 36 addici sao, 5ao, 36 #9+4 (BBD)(9) addic sao, 5ao, st7 # BBTI+1] [EN-1 + li st6,0 -for8 slti st1, sto, 20 # i < 10	BTIJEN-5-1] =- (-B+ +N-5-1)) I No allements
addui 500, 500, 35 #9+4 (CBIDITY) & addu 500, 500, \$t7 # &BCitiIten-1 + li \$t6,0	e) Stock & (BEIHIZEN-5-1-5)=B+++N+3+N+N+	1-2) 4(N 1) bytes.
addui 500, 500, 35 #9+4 (CBIDITY) & addu 500, 500, \$t7 # &BCitiIten-1 + li \$t6,0	le 5+7, 4+(N-1) #36 { So) \$700.0	(500)
li \$t6,0 -for8 -for8 -slti \$t1,\$t0,20# i(10)		
-for8 seti sts, sto, sot i (10)		
sete \$61, \$t0, 50 # i <10		
	beg sts, szero, end-for.	