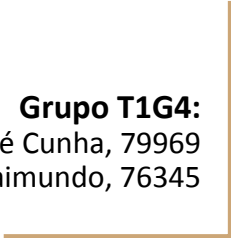# Arquitetura de Computadores Avançada, 2018-2019

Assignment 1 - Hamming Code

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Matrizes A e H

- A:

1	1	1	0	1	1	1	0	0	0	1
1	1	0	1	1	0	0	1	1	0	1
1	0	1	1	0	1	0	1	0	1	1
0	1	1	1	0	0	1	0	1	1	1

- H = || A || Ir ||

1	1	1	0	1	1	1	0	0	0	1	1	0	0	0
1	1	0	1	1	0	0	1	1	0	1	0	1	0	0
1	0	1	1	0	1	0	1	0	1	1	0	0	1	0
0	1	1	1	0	0	1	0	1	1	1	0	0	0	1

Matriz G

G = || Ik || - AT ||

1	0	0	0	0	0	0	0	0	0	0	1	1	1	0
0	1	0	0	0	0	0	0	0	0	0	1	1	0	1
0	0	1	0	0	0	0	0	0	0	0	1	0	1	1
0	0	0	1	0	0	0	0	0	0	0	0	1	1	1
0	0	0	0	1	0	0	0	0	0	0	1	1	0	0
0	0	0	0	0	1	0	0	0	0	0	1	0	1	0
0	0	0	0	0	0	1	0	0	0	0	1	0	0	1
0	0	0	0	0	0	0	1	0	0	0	0	1	1	0
0	0	0	0	0	0	0	0	1	0	0	0	1	0	1
0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
0	0	0	0	0	0	0	0	0	0	1	1	1	1	1

Equações

- Encoder:
  - $x14 = m10$
  - ...
  - $x4 = m0$
  - $x3 = [(m0 \oplus m6) \oplus (m9 \oplus m10)] \oplus [(m4 \oplus m5) \oplus m8]$ - **3** atrasos
  - $x2 = [(m0 \oplus m6) \oplus (m9 \oplus m10)] \oplus [(m2 \oplus m3) \oplus m7]$ - **3** atrasos
  - $x1 = [(m0 \oplus m1) \oplus (m7 \oplus m8)] \oplus [(m3 \oplus m5) \oplus m10]$ - **3** atrasos
  - $x0 = [(m0 \oplus m1) \oplus (m7 \oplus m8)] \oplus [(m2 \oplus m4) \oplus m9]$ - **3** atrasos

  18 $\oplus$

- Decoder:
  - $e3 = [(y4 \oplus y10) \oplus (y13 \oplus y14)] \oplus [(y3 \oplus y8) \oplus (y9 \oplus y12)]$ - **3** atrasos
  - $e2 = [(y4 \oplus y10) \oplus (y13 \oplus y14)] \oplus [(y2 \oplus y6) \oplus (y7 \oplus y11)]$ - **3** atrasos
  - $e1 = [(y4 \oplus y5) \oplus (y11 \oplus y12)] \oplus [(y1 \oplus y7) \oplus (y9 \oplus y14)]$ - **3** atrasos
  - $e0 = [(y4 \oplus y5) \oplus (y11 \oplus y12)] \oplus [(y0 \oplus y6) \oplus (y8 \oplus y13)]$ - **3** atrasos

  22 $\oplus$