CO450 Computer Architectures Week 12 Exercise Handout

Even and Odd Parity Checking

Using an **Even Parity Bit Check**, check the following data transmissions by adding your own parity bit in the empty column and ticking the appropriate result:

1	0	0	1	0	0	1	0	1	Correctly Transmitted ☐ Error Detected ☑
0	1	1	0	0	0	1	0	1	Correctly Transmitted ☐ Error Detected ☑
0	0	1	1	0	0	1	1	0	Correctly Transmitted ☑ Error Detected ☐
1	0	0	0	1	1	0	1	0	Correctly Transmitted ☑ Error Detected ☐

Using an **Odd Parity Bit Check**, check the following data transmissions by adding your own parity bit in the empty column and ticking the appropriate result:

1	1	1	0	0	1	1	0	0	Correctly Transmitted ☑ Error Detected ☐
0	0	0	1	1	0	1	0	0	Correctly Transmitted ☐ Error Detected ☐
0	0	1	1	1	1	1	1	1	Correctly Transmitted ☐ Error Detected ☐
1	0	0	0	0	1	0	1	0	Correctly Transmitted ☐ Error Detected ☐

Two-Dimensional Even Parity Scheme

Check the transmissions below with a Two-Dimensional Even Parity Scheme by adding your own parity bits to the rows and columns and ticking the appropriate result(s). If you do identify a single bit error reference which bit has the error by entering its Row and Bit Number e.g. R1 B0

1.

	B5	B4	B3	B2	B1	B0	
R1	1	1	1	0	1	0	0
R2	1	0	0	1	0	0	0
R3	0	0	0	1	1	0	0
R4	0	1	1	0	0	1	1
	0	0	0	0	0	1	1

Correctly transmitted ☐
Error detected ☒
Error can be corrected ☒
Single Bit Error in: R4 B0

2.

	B5	B4	B3	B2	B1	B0	
R1	0	0	1	1	1	1	0
R2	0	1	1	1	1	1	1
R3	0	1	1	1	1	0	0
R4	0	0	1	0	1	0	0
	0	0	0	1	0	0	1

Correctly transmitted ☐
Error detected ☒
Error can be corrected ☒
Single Bit Error in: R2 B2

Two-Dimensional Odd Parity Scheme

Check the transmissions below with a Two-Dimensional Odd Parity Scheme by adding your own parity bits to the rows and columns and ticking the appropriate result(s). If you do identify a single bit error reference which bit has the error by entering its Row and Bit Number e.g. R1 B0

1.

	B5	B4	B3	B2	B1	B0	
R1	1	0	1	0	1	0	0
R2	1	0	0	0	1	1	0
R3	1	1	0	1	1	0	1
R4	1	0	0	0	0	0	0
	1	0	0	0	0	0	1

Correctly transmitted ☐
Error detected ☑
Error can be corrected ☑
Single Bit Error in: _____

R3 B4

2.

	B5	B4	B3	B2	B1	B0	
R1	1	0	1	1	0	1	1
R2	0	1	0	1	0	1	0
R3	1	1	0	0	1	0	0
R4	1	1	1	1	0	1	0
	0	0	1	0	0	0	1

Correctly transmitted ☐
Error detected ☑
Error can be corrected ☑
Single Bit Error in: _____

R1 B3

The Answers

Using an **Even Parity Bit Check**

1	0	0	1	0	0	1	0	**1**	Correctly Transmitted ☐ Error Detected ☒
0	1	1	0	0	0	1	0	**1**	Correctly Transmitted ☐ Error Detected ☒
0	0	1	1	0	0	1	1	**0**	Correctly Transmitted ☒ Error Detected ☐
1	0	0	0	1	1	0	1	**0**	Correctly Transmitted ☒ Error Detected ☐

Using an **Odd Parity Bit Check**

1	1	1	0	0	1	1	0	**0**	Correctly Transmitted ☒ Error Detected ☐
0	0	0	1	1	0	1	0	**0**	Correctly Transmitted ☒ Error Detected ☐
0	0	1	1	1	1	1	1	**1**	Correctly Transmitted ☐ Error Detected ☒
1	0	0	0	0	1	0	1	**0**	Correctly Transmitted ☒ Error Detected ☐

Two-Dimensional Even Parity Scheme

1.

	B5	B4	B3	B2	B1	B0	
R1	1	1	1	0	1	0	**0**
R2	1	0	0	1	0	0	**0**
R3	0	0	0	1	1	0	**0**
R4	0	1	1	0	0	**1**	**1**
	0	**0**	**0**	**0**	**0**	**1**	**1**

Correctly transmitted ☐
Error detected ☒
Error can be corrected ☒
Single Bit Error in: R4 B0

2.

	B5	B4	B3	B2	B1	B0	
R1	0	0	1	1	1	1	**0**
R2	0	1	1	**1**	1	1	**1**
R3	0	1	1	1	1	0	**0**
R4	0	0	1	0	1	0	**0**
	0	**0**	**0**	**1**	**0**	**0**	**1**

Correctly transmitted ☐
Error detected ☒
Error can be corrected ☒
Single Bit Error in: R2 B2

Two-Dimensional Odd Parity Scheme

1.

	B5	B4	B3	B2	B1	B0	
R1	1	0	1	0	1	0	**0**
R2	1	0	0	0	1	1	**0**
R3	**1**	1	0	1	1	0	**1**
R4	1	0	0	0	0	0	**0**
	1	**0**	**0**	**0**	**0**	**0**	**1**

Correctly transmitted ☐
Error detected ☒
Error can be corrected ☒
Single Bit Error in: R3 B5

2.

	B5	B4	B3	B2	B1	B0	
R1	1	0	**1**	1	0	1	**1**
R2	0	1	0	1	0	1	**0**
R3	1	1	0	0	1	0	**0**
R4	1	1	1	1	0	1	**0**
	0	**0**	**1**	**0**	**0**	**0**	**1**

Correctly transmitted ☐
Error detected ☒
Error can be corrected ☒
Single Bit Error in: R1 B3