CS2700 Homework 2

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Question 1.

5.10

For the Hamming code show in Figure 5.10, show what happens when a check bit rather than a data bit is in error ?

Position	12	11	10	9	8	7	6	5	4	3	2	1
Bits	D8	D7	D6	D5	C8	D4	D3	D2	C4	D1	C2	C1
Block	0	0	1	1	1	1	0	0	1	1	1	1
Codes			1010	1001		0111				0011		

Position	Code
Hamming	1111
10	1010
9	1001
7	0111
3	0011
XOR'd	1000

It detects that there is an error in position 8.

Question 2.

5.13

$2^r \geq m + r + 1$

$2^r \geq 1024 + r + 1, r = 10$

$2^10 \geq 1024 + 10 + 1$

$1024 \geq 1024 + 10 + 1$ false

$2^11 \geq 1024 + 11 + 1$

$2048 \geq 1036$ true

A minimum of 11 check bits needed for 1024-bit Hamming code error correction

Question 3.

6.5

(a) Average Seek Time
Becuase we start at track 0 of 30,000, the most we would have to traverse is 29,999 tracks
Average track number is $\frac{29,999}{2} = 14,999.5$
Average track seek time with a $\frac{100tracks}{1ms}$
$14,999.5/100 = 149.995$ ms

(b) Average Rotational Latency
$\frac{7200rev}{minute} * \frac{Minute}{60sec} * \frac{Second}{1000ms} = 8.33ms$
Because the average track is in the middle of any two given tracks we divide by 2
$\frac{8.333}{2} = 4.16\overline{6}ms$

(c) Transfer time per sector
$\frac{600sectors}{track}$ or $\frac{600sectors}{revolution} \rightarrow \frac{8.333ms}{revolution} * \frac{revolution}{600track} = 0.01389ms$

(d) Average Total Satisfy Time
$149.995 + 4.1660.01389 = 154ms$