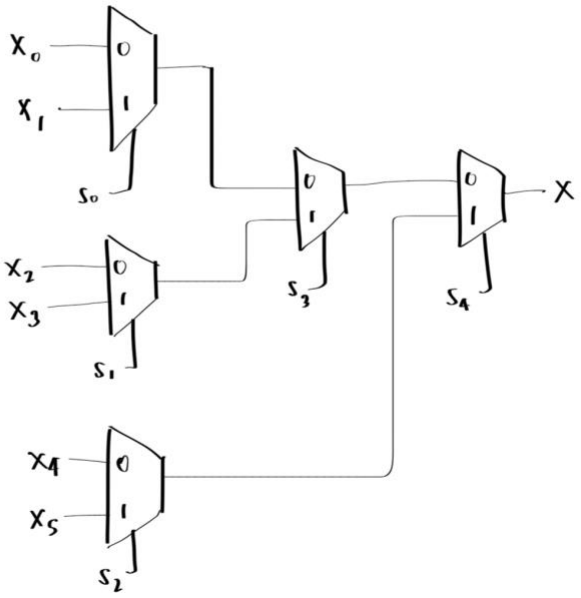
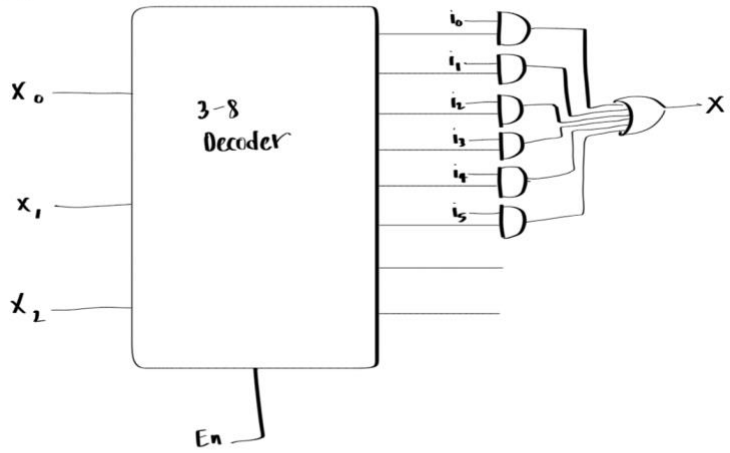
CPRE381 Homework 0

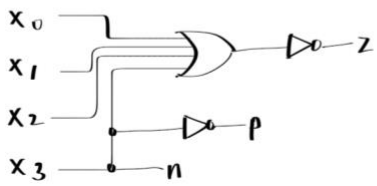
1) a. $\log_2 6 = 3$ or $2^3 > 6$ $\therefore$ 3 bits



b)



c)



d) $\log_2(60 \times 10^{12}) = 46$ (rounded up)

e) 0x3815 7EE9

$2^3\ 2^2\ 2^1\ 2^0$
$8\ 4\ 2\ 1$

	3	8	1	5	7	E	E	9
binary:	0011	1000	0001	0101	0111	1110	1110	1001

decimal: $(3 \times 16^7) + (8 \times 16^6) + (1 \times 16^5) + (5 \times 16^4) + (7 \times 16^3) + (14 \times 16^2) + (14 \times 16^1) + (9 \times 16^0)$
$= 940,932,841$

2a) **iPhone 16 Pro Max**
Input: Touchscreen Display (Capacitive sensor), FaceID (TrueDepth Camera), Microphone
Output: LTPO Super Retina XDR OLED Display, Stereo Speakers, Taptic Engine
Memory: LPDDR5X RAM, NAND Flash Storage
Datapath: Neural Engine
Control: A18 Pro

Sources used:
https://www.gsmarena.com/apple_iphone_16_pro_max-13123.php
https://support.apple.com/en-us/121032

2b)
The 1940s: Manchester Baby (Memory: 128 Bytes, 0.125 KibiBytes)
https://blog.google/around-the-globe/google-europe/youve-come-long-way-baby-remembering/#:~:text=Manchester%20Baby%3A%20world's%20first%20stored%20program%20computer&text=In%20technical%20terms%2C%20the%20Williams,equivalent%20to%20just%20128%20bytes.

The 1950s: ENIAC (Memory: 20 Bytes, 0.0195 KibiBytes)
It was released in 1945, but Memory was built in 1953.
https://en.wikipedia.org/wiki/ENIAC

The 1960s: Atlas Computer (Memory: 524,288 Bytes, 512 KibiBytes)
https://ethw.org/Milestones:Atlas_Computer_and_the_Invention_of_Virtual_Memory,_1957-1962#:~:text="The%20virtual%20memory%20system%20provided,large%20page%2C%20contains%20524%2C288%20bytes.

The 1970s: IBM 2321 Data Cell Drive (Memory: 400 million Bytes, 381 MebiBytes)
https://www.columbia.edu/cu/computinghistory/datacell.html

The 1980s: Macintosh (Memory: 400,000 Bytes, 0.381 MebiBytes)
https://computeradsfromthepast.substack.com/p/byte-interview-with-the-creators

The 1990s: BeBox (Memory: 256 MegaBytes, 244.141 MebiBytes)
http://testou.free.fr/www.beatjapan.org/mirror/www.be.com/products/bebox/dual603ds.html

The 2000s: MacBook Pro (2006) (Memory: 1 GigaByte, 0.931 GibiBytes)
https://lowendmac.com/2006/15-in-macbook-pro-late-2006/

The 2010s: iPhone 4 (Memory; 512 MegaBytes, 0.476 GibiBytes)
https://support.apple.com/en-us/112562

The 2020s: Fagaku (Memory: 4.85 PetaBytes, 4516914 GibiBytes)
https://www.fujitsu.com/global/about/innovation/fugaku/specifications/

2c)

(1) 20 minutes
(2) 1328 Characters
(3) 33,608 Bytes, ARM
(4) 0.004