CEG3185 Assignment 1
Answers are denoted by (***) on the same line

1. Answer: -
2. Answer: -
3. Answer:
    a. 2*(highest frequency) = 4200 * 2 = 8400 bits/second.
    b. SNRdb = 6.02n + 1.76
        36 = 6.02n + 1.76
        (36 - 1.76)/6.02 = n
        n = 5.86 = 6.
        2^n = 2^6 = 64. ***
    c. Data rate = sampling rate * n.
        Data rate = 8400 * 6
        Data rate = 50,400 bits per second ***
    d. First find ∂V.
        ∂V = (Vhi - Vlow)/2^n
        ∂V = (5 - (-5))/64)
        ∂V = 0.156
        PCM(-3.3V) = (-3.3 - (-5))/∂V
            = (-3.3 - (-5))/0.156
            = 10.89 = 11.
        PCM(2.9V) = (2.9V - (-5))/∂V
            = (2.9 + 5)/0.156
            = 50.64 = 51
        PCM(-3.3V) = 001011 *****
        PCM(2.9V) = 110011 *****
4. A = (highest point - lowest point)/2
        = 2. ***
    F = Frequency.
    Note how the number of periods double from the original graph.
        = 2 ***
    Ø = ø(n) - ø(0)
        = π - 0
        = π
5. SNR = signal/noise
        = 10^{-4} / $10^{-8.7}$
        =50118.7233
        = 50,118.72
    SNRdb = $10\log_{10}$(SNR)
        = $10\log_{10}$(50,118.72)
        = 46.999
        = 47 db ***

6. $B = F_{high} - F_{low}$
   $= 5000 - 600$
   $= 4400$ Hz.

   We need to start by using Shannon, so we need SNR.
   $SNRdb = 10\log_{10}(SNR)$
   $SNR = 10^{SNRdb/10}$
   $SNR = 10^{42/10}$
   SNR = 15,843.93

   Shannon Capacity = C
   $C = B*\log_2(1+SNR)$
   $= 4400 * \log_2(16,843.93)$
   $= 4400 * 14.039$
   = 61711.6 bps

   80% of C = 49,417.28 bps

   Now use Nyquist:
   $C = 2B * \log_2 L$
   $49,417.28 = 2(4400) * \log_2 L$
   L = 49
   Compare L to nearest-lowest 2^n value.

   In this case, $2^5 = 32$, therefore, we need 32 signal levels
7.
   (cable) loss of -0.4km/db

   P1 = 3mW P2 = ? @ 14km

   First, find total loss:
   $Loss = distance_{km} * loss\ rate$
   $= 14 * -0.4$
   $= -5.6$

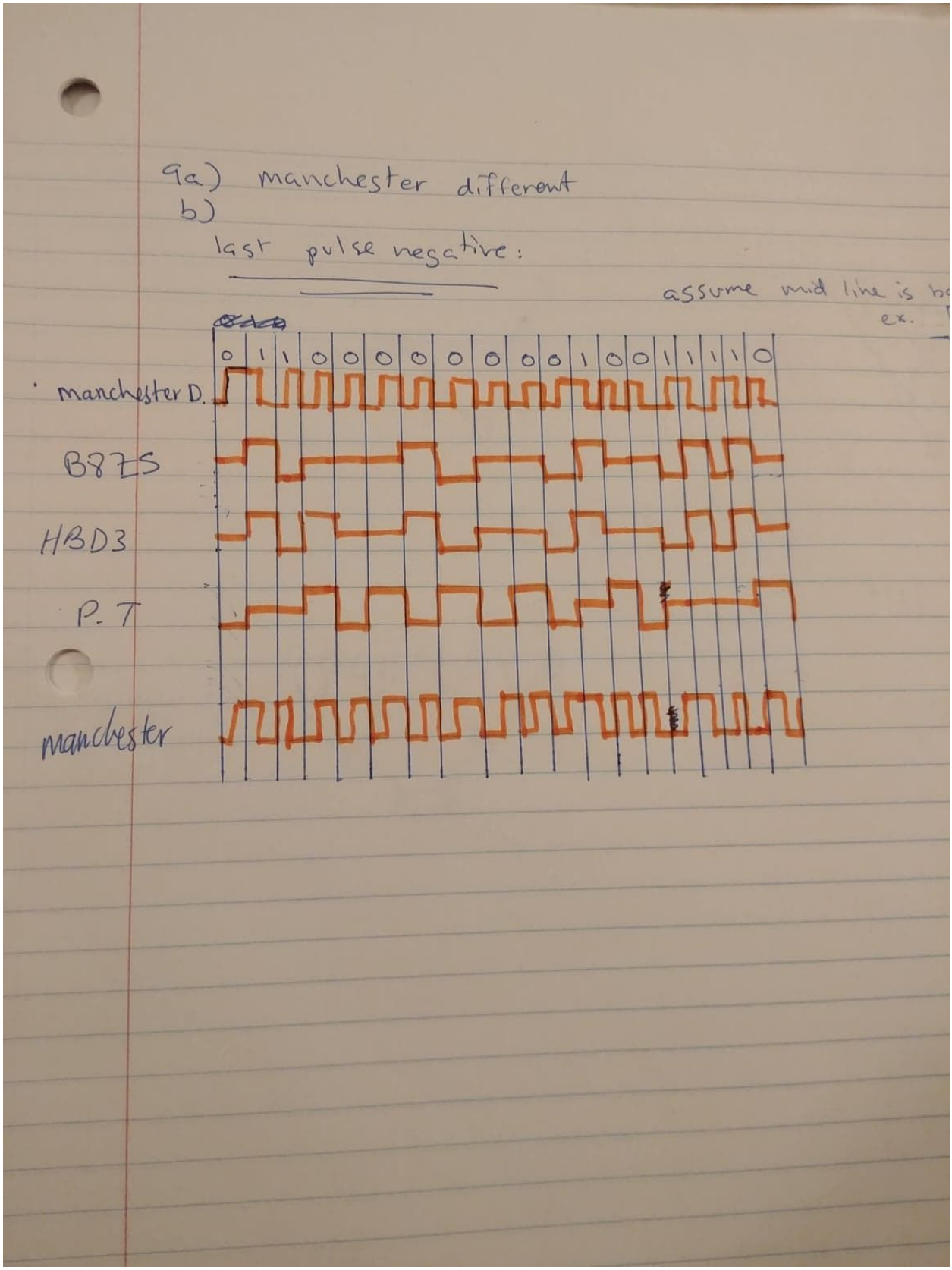
   Attenuation Formula:
   $Loss/gain = 10\log_{10}(p2/p1)$
   $-5.6 = 10\log_{10}(p2/3mW)$
   P2 = 0.826 mW

8.

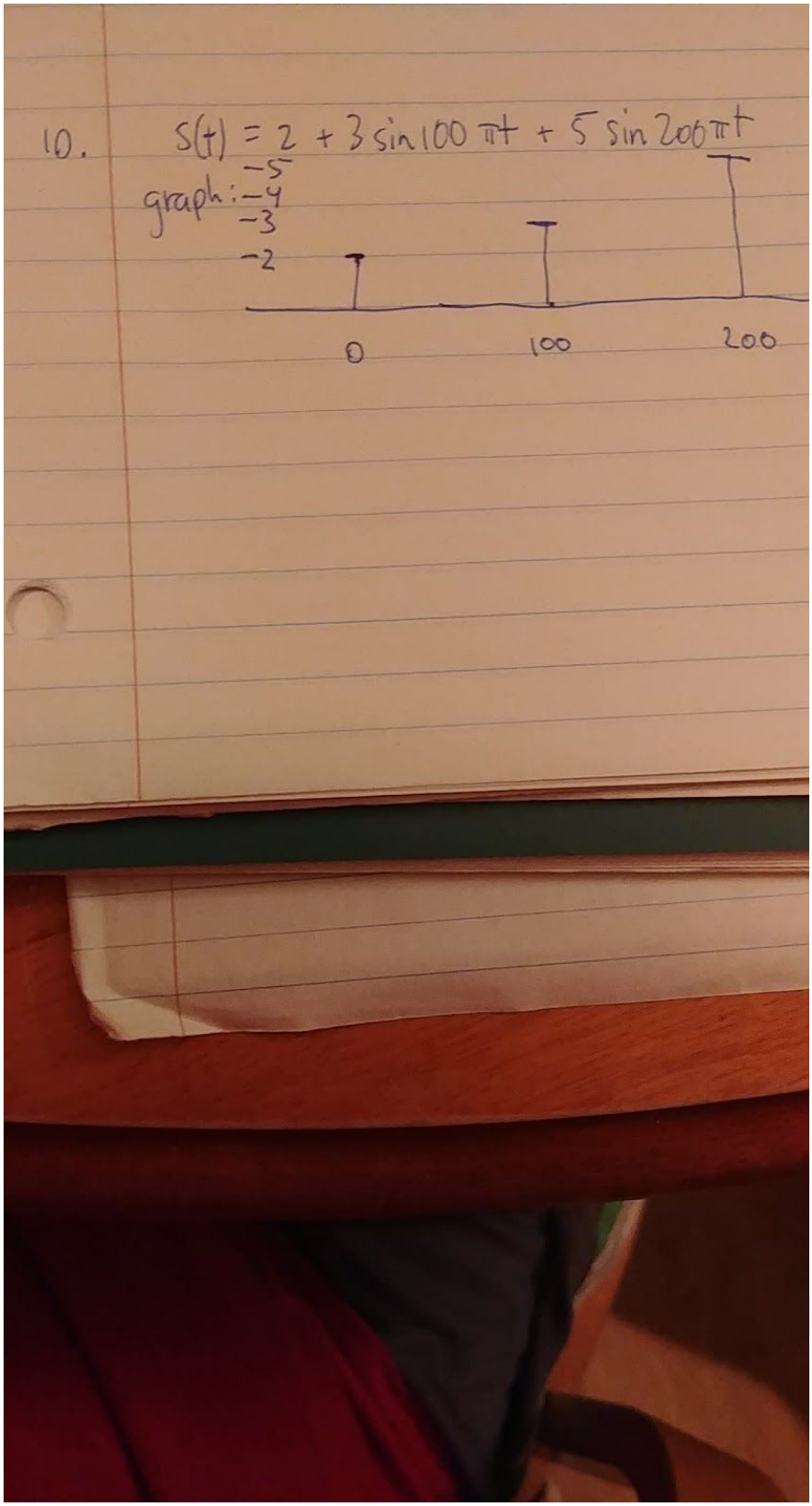
Layer	Protocol Data Unit	Address	Example of

			Address
Application	Message	Message	“hello”
Transport	Segment	Ports	Src = 8080 dest = 8081
Network	Datagramme	IP Addresses	Src = 192.168.1.1 dest = 192.168.1.2
Data Link	Frame	Link Layer	Src = AA-BB-CC-DD-EE-FF Dest = AA-BB-CC-DD-EF-FF
Physical	Bits		101010101

9. See image:

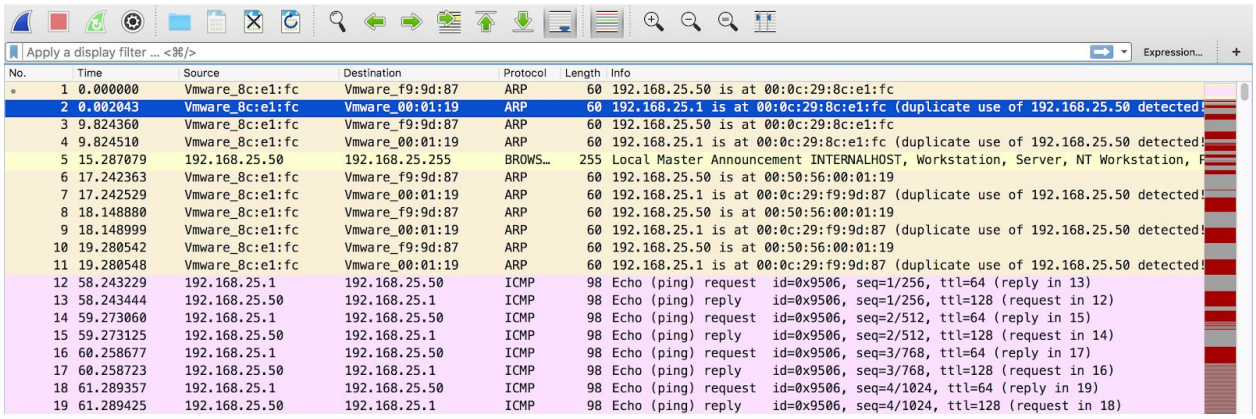

9a) manchester different
b)
last pulse negative:
assume mid line is
ex.
0 1 1 0 0 0 0 0 0 0 0 1 0 0 1 1 1 1 0
manchester D.
B8ZS
HBD3
P.T
manchester

10. See image:



11. BONUS

The attack being done is ARP Spoofing. The info shows IP duplicates being used, where information may be jeopardized here.



Apply a display filter ... <⌘/>

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	Vmware_8c:e1:fc	Vmware_f9:9d:87	ARP	60	192.168.25.50 is at 00:0c:29:8c:e1:fc
2	0.002043	Vmware_8c:e1:fc	Vmware_00:01:19	ARP	60	192.168.25.1 is at 00:0c:29:8c:e1:fc (duplicate use of 192.168.25.50 detected!
3	9.824360	Vmware_8c:e1:fc	Vmware_f9:9d:87	ARP	60	192.168.25.50 is at 00:0c:29:8c:e1:fc
4	9.824510	Vmware_8c:e1:fc	Vmware_00:01:19	ARP	60	192.168.25.1 is at 00:0c:29:8c:e1:fc (duplicate use of 192.168.25.50 detected!
5	15.287079	192.168.25.50	192.168.25.255	BROWS…	255	Local Master Announcement INTERNALHOST, Workstation, Server, NT Workstation, F
6	17.242363	Vmware_8c:e1:fc	Vmware_f9:9d:87	ARP	60	192.168.25.50 is at 00:50:56:00:01:19
7	17.242529	Vmware_8c:e1:fc	Vmware_00:01:19	ARP	60	192.168.25.1 is at 00:0c:29:f9:9d:87 (duplicate use of 192.168.25.50 detected!
8	18.148880	Vmware_8c:e1:fc	Vmware_f9:9d:87	ARP	60	192.168.25.50 is at 00:50:56:00:01:19
9	18.148999	Vmware_8c:e1:fc	Vmware_00:01:19	ARP	60	192.168.25.1 is at 00:0c:29:f9:9d:87 (duplicate use of 192.168.25.50 detected!
10	19.280542	Vmware_8c:e1:fc	Vmware_f9:9d:87	ARP	60	192.168.25.50 is at 00:50:56:00:01:19
11	19.280548	Vmware_8c:e1:fc	Vmware_00:01:19	ARP	60	192.168.25.1 is at 00:0c:29:f9:9d:87 (duplicate use of 192.168.25.50 detected!
12	58.243229	192.168.25.1	192.168.25.50	ICMP	98	Echo (ping) request id=0x9506, seq=1/256, ttl=64 (reply in 13)
13	58.243444	192.168.25.50	192.168.25.1	ICMP	98	Echo (ping) reply id=0x9506, seq=1/256, ttl=128 (request in 12)
14	59.273060	192.168.25.1	192.168.25.50	ICMP	98	Echo (ping) request id=0x9506, seq=2/512, ttl=64 (reply in 15)
15	59.273125	192.168.25.50	192.168.25.1	ICMP	98	Echo (ping) reply id=0x9506, seq=2/512, ttl=128 (request in 14)
16	60.258677	192.168.25.1	192.168.25.50	ICMP	98	Echo (ping) request id=0x9506, seq=3/768, ttl=64 (reply in 17)
17	60.258723	192.168.25.50	192.168.25.1	ICMP	98	Echo (ping) reply id=0x9506, seq=3/768, ttl=128 (request in 16)
18	61.289357	192.168.25.1	192.168.25.50	ICMP	98	Echo (ping) request id=0x9506, seq=4/1024, ttl=64 (reply in 19)
19	61.289425	192.168.25.50	192.168.25.1	ICMP	98	Echo (ping) reply id=0x9506, seq=4/1024, ttl=128 (request in 18)