## Module 1 Assignments

Please submit your answers in PDF or Word Format. Do not use .pages format.

## Part 1 (80 points)

Each question is worth 4 points

**Convert the following decimal numbers to binary:**

1. 1000 = 0011 1110 1000 = 512+256+128+64+32+8  
2. 1100 = 0100 0100 1100 = 1024 + 64 + 8 + 4

**Binary Addition**

3. 101 + 10 = 111 = 7  
 101  
+010  
 111

4. 1100 + 11 = 1111 = 15  
 1100  
+0011  
 1111  
5. 1111 + 1001 = 11000 = 24  
 01111  
+01001  
 11000

6. 111 + 111 = 1110 = 14  
 0111  
+0111  
 1110

**Binary Subtraction**

7. 101 – 10 = 01 = 1  
 101  
-010  
01  
8. 1100 – 11 = 1001 = 9  
 1100  
- 0011  
 1001  
9. 1111 – 1001 = 110 = 6  
 1111  
- 1001  
 0110  
  
10. 111 – 111 = 0

**Binary Multiplication**

11. 100 x 10 = 1000 = 8  
 000100  
x 000010  
 000000  
 000100  
 0001000  
12. 10 x 10 = 100 = 4  
 0010  
x 0010  
 0000  
 0010  
 00100  
13. 1100 x 11 = 100100 = 36  
 00001100  
x 00000011  
 00001100  
 00001100   
 000100100  
14. 1000 x 11 = 11000 = 24  
 001000  
x 000011  
 001000  
 001000   
 11000

**Binary Division**

15. 100 / 10 = 10 = 2  
16. 10 / 10 = 1 = 1  
17. 1100 / 11 = 100 = 4   
18. 1000 / 11 = 10 R 10 = 2 R 2  
 0010 R 10   
11 | 1000

**Convert the following positive binary numbers to their negative two's complement equivalent:**

19. 0100 0100 = 1011 1100  
1011 1011  
+ 1  
1011 1100  
20. 0100 1101 = 1011 0011

1011 0010  
+ 1  
1011 0011

## Part II (20 points)

Each question is worth 4 points

**Pixels and File Sizes**

21. Calculate the bits required to store an uncompressed image with a width of 125 pixels, a height of 100 pixels, and a color depth of 16-bits.  
 125 12500  
 x 100 x 16  
 12500 75000  
 + 125000  
 200000

22. Calculate the number of bits required to store 12 minutes of uncompressed video that has a frame size of 1,920 by 1,080 pixels, a 48-bit color depth and a frame rate of 30 frames per second.

1920 2073600 99532800 179159040000  
 x 1080 x 48 x 30 x 12  
 153600 16588800 2985984000 358318080000  
+1920000 +82944000 x 60 +1791590400000   
 2073600 99532800 179159040000 2,149,908,480,000

23. Calculate the file size of an uncompressed mono audio file with a sample rate of 44.1 kHz, a bit depth of 16 bits, and a length of 4 minutes 23 seconds. How large would the file be if it was for stereo audio?  
 44100 smp/s 705600 bit/s  
 x 16 bits/smp x 263 sec  
264600 bit/s 2116800  
441000 bit/s 42336000  
705600 bit/s +141120000  
 185572800 bits MONO (185.5728Mb or ~22MB)  
  
  
  
 44100 smp/s 705600 bit/s 4233600 bit   
 x 16 bits/smp x 2 ch 84672000 bit  
 264600 bit/s 1411200 bit/s 282240000 bit  
 441000 bit/s x 263 sec 371145600 bits STEREO (371.1456Mb or ~44MB)  
 705600 bit/s (new col.) (new col.)

24. A bitmap image has a width of 6 inches and a height of 4 inches. If the image has a resolution of 72 pixels per linear inch, what is the total number of pixels in the image.  
 72 px/in 432 px  
 x6 in x 288 px  
432 px 3456 px  
 72 px/in 34560 px   
 x4 in + 86400 px  
288 px 124416 px

25. The average internet download speed in the USA is currently 18.7 Mbps. At this speed how long will it take to download an uncompressed 125 Megabit file.

125mb / 18.7mb/s = 6.845s

## Part III (0 points)

Purchase Items on the purchase list. You **do not** need to submit proof that you have purchased the items.