

Notes added after class on 9/11/2008: See highlighted text below in Q1 (line 3) and Q2 (with new links provided).

Instructions: Write (or type up) your answers clearly and concisely. Be sure your answers represent your own work, i.e, no plagiarism or team work is accepted. No late assignments will be accepted unless prior arrangements are made.

1. Given the following 64-bit floating-point value in IEEE 754-1985 format:
1 11010110011 0101001 (followed by 45 zeros).
Be sure to show **how** the calculations are done manually or using a calculator (e.g., using Windows Calculator):
 - (a) Find the decimal value (and show the steps of your work).
 - (b) Conversely, convert the answer of Part (a) back to the 64-bit floating-point format (and show the steps of your work).
2. The Windows NTFS file system stores date/time stamps for files using the UTC/GMT format. The procedure below describes conversion of UTC/GMT time to local time: As an example, if the 8 bytes of the file creation time for a file is “E4 76 D9 6E 1E CF C7 01” in little-endian format (thus, the first byte E4 is the least-significant byte, the last byte 01 is the most-significant byte). Using Windows Calculator converts the hex value (entered as 01C7CF1E6ED976E4) to decimal value 128298844019062500. This is the NTFS internal timestamp value, which counts the number of 100-nano-second intervals measured from 1 January 1601, 00:00:00 UTC time. The date/time stamps can be found in the NTFS MFT (master file table) as follows: go to byte offset 80 of an MFT entry (file record) to extract 4 date/time stamps: file creation time, file last modification time, MFT entry altered time, and file last access time, each using 8 bytes in a little-endian format expressed in UTC (Universal Coordinated Time). More details about the MFT entry can be found by consulting the MFT attributes information at <http://www.easeus.com/data-recovery-ebook/mft-file-analyzes.htm>. Suppose you find the following 8 bytes representing a file creation time in an MFT entry, 40590aed40fec701. Convert this value to decimal value showing the number of 100-nano-second intervals measured from 1 January 1601, 00:00:00 UTC time.

Note: A tool that converts the 64-bit NTFS time stamp to local time is Craig Wilson's DCode program, available including documentation at <http://www.digital-detective.co.uk/freetools/decode.asp>, FYI.