ECE/CompSci 250 HW #1

1.

a) 45 → Binary $45-32=13-8=5-4=1-1=0$ 00100100 → 2, 13 → D
→ Hexadexima
$45_{10} = 00101101_2 = 0000002D_{16}$

b) -35_{10} $35_{10} = 00100011_2 \cdot -1 = 11011100+1 = 11011101_2$
$00100011_2 \rightarrow x_{16} = 00000023 \cdot 1$ FFFFFFFF - 00000023 = FFFFFFDC + 1
$= FFFFFFDB_{16}$ $-35_{10} = 11011101_2 = FFFF FFDB_{16}$

c) $47_{10} \rightarrow 00101111_2$ ~~$0.01111 \cdot 2^5$~~ $00101111_2 = 1.01111 \cdot 2^5$
$5+127 = 132_{10} \rightarrow 10000100_2$ 011 11
0 / 01000100 / 011 1100 0000 0000 0000 0000 = 0x423C0000
$47_{10} = 00100010000111100000000000000000_2 = 0x423C0000_{16}$

d) $.625_{10} = \frac{5}{8} = \frac{1}{2}+\frac{1}{8} = \frac{5}{8} = 0.101 = 1.01 \times 2^{-1}$ $-.625 = -1.01 \times 2^{-1}$
IEEE = 1 for negative, $-1+127 = 126_{10} = 01111110$, mantissa = 01+21 0
= 1 / 0111 1110 / 010 0000 0000 0000 0000 0000 → $BF200000_{16}$
$-.625_{10} = 10111110\,0010\,0000\,0000\,0000\,0000\,0000_2 = 0xBF200000_{16}$

e) Strings for 250!\n ASCII = ~~123 164 162~~ ~~I looked up an ASCII table since it seems that the one in the slides is incorrect~~ are NVM
Strings = 123 164 162 151 156 147 163 040_8 = 53 74 72 69 6E 67 73 20
for = 146 157 162 040_8 = 65 6F 72 20
250! \n = 062 065 060 041 134 156$_8$ = 32 35 30 21 5C 6E
Strings for 250!\n = 53 74 72 69 6E 67 73 20 65 6F 72 20 32 35 30 21 5C 6E

f) $1.01 \cdot 2^{4046}$ because the Exponent is determined by ~~subtracting~~ adding 1023 so since 4046+1023 is larger than what 11 bits can represent.

2. a) a is on the stack, b_ptr is on the heap, *b_ptr is on the stack, e_ptr is a part of the global data, and *e_ptr is on the stack.

b) e_ptr → &a → 1.2, b_ptr[0] → &float malloc → 7.0 & b_ptr → 4.0

foo(e_ptr, b_ptr, b_ptr+1) → 1.2 < 7+4 so return 1
(1.2, 7.0, 4.0)

1 > 0.5 so return 1

3. Unopt time = .964s Opt time = .832s

Both programs print out C[111][392] = -1801742042. I assume there is some underlying calculations but the optimized program did it faster by .132 seconds