Q1. Assembly Language acts as a language translation between High-level Language and Machine Language.

High-level Language consists of human understandable English words. Computer does not understand it. Machine Language consists of binary numbers. Humans do not understand. Therefore, we need translation.

Q2.

$(B855486B)_{16}$ = $(1011\ 1000\ 0101\ 0101\ 0100\ 1000\ 0110\ 1011)_2$ is a 32-bit word.

(a) In ASCII Table, each character is a 8-bit word, so there should be 4 characters.
$(1011\ 1000)_2 = 184_{10}$, representing ©
$(0101\ 0101)_2 = 85_{10}$, representing U
$(0100\ 1000)_2 = 72_{10}$, representing H
$(0110\ 1011)_2 = 107_{10}$, representing k
So the 32-bit word represent ©UHk

(b) Unsigned integer is 32-bit.
$2^{31}+2^{29}+2^{28}+2^{27}+2^{22}+2^{20}+2^{18}+2^{16}+2^{14}+2^{11}+2^{6}+2^{5}+2^{3}+2^{1}+2^{0}$
$=(3\ 092\ 596\ 843)_{10}$

(c) Signed integer using sign-and-magnitude means the most significant binary represents the sign of the number. The first binary is 1, so the value is negative.
$-(2^{29}+2^{28}+2^{27}+2^{22}+2^{20}+2^{18}+2^{16}+2^{14}+2^{11}+2^{6}+2^{5}+2^{3}+2^{1}+2^{0})$
$=(-945\ 113\ 195)_{10}$

(d) The rule of 1's-complement is inverting each bit of positive number to represent negative number.
$(1011\ 1000\ 0101\ 0101\ 0100\ 1000\ 0110\ 1011)_2$
converted from
$(0100\ 0111\ 1010\ 1010\ 1011\ 0111\ 1001\ 0100)_2$
It represents
$2^{30}+2^{26}+2^{25}+2^{24}+2^{23}+2^{21}+2^{19}+2^{17}+2^{15}+2^{13}+2^{12}+2^{10}+2^{9}+2^{8}+2^{7}+2^{4}+2^{2}$
$=(1\ 202\ 370\ 452)_{10}$
So the original 32-bit word represents $(-1\ 202\ 370\ 452)_{10}$

(e) We add 1 to the answer of part(d) of that negative part.
It represents $(-1\ 202\ 370\ 453)_{10}$

(f) The first binary bit is 1, so the number is negative.
The eight binary bits are $(01110000)_2$ = 112, 112-127 = -15, so the exponent part is -15.
The mantissa part is 101 0101 0100 1000 0110 1011
$(.101\ 0101\ 0100\ 1000\ 0110\ 1011)_2$
$=(2^{22}+2^{20}+2^{18}+2^{16}+2^{14}+2^{11}+2^{6}+2^{5}+2^{3}+2^{1}+2^{0})/(2^{23})=0.666272401\ldots$
So the decimal value is $1.666272401 * 2^{-15}$
$=5.085060184\ldots * 10^{-5}$

Q3. The computer system has a memory system of 3 GB.

(a) $3 * 2^{30} * 8 = 2.576980378\ldots * 10^{10}$ bits
$3 * 2^{30}$ = 3 221 225 472 bytes
The word size of the computer system is 32 bits.
$3 * 2^{30} * 8 / 32$ = 805 306 368 words

(b) $3 * 2^{30} > 2^{31}$ bytes
At least 32 bits of memory addresses are required.

(c) Big Endian

	0	+1	+2	+3
200	6A	73	8C	9E
204	C	S	C	I
208	2	5	1	0

Little Endian

	+3	+2	+1	0
200	9E	8C	73	6A
204	I	C	S	C
208	0	1	5	2