2. Numbers - Examples

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Outline

Ex1 - (a)

```
#include <stdio.h>

int main(void)
{
    printf("%4d  %4x\n",  0,  0);
    printf("%4d  %4x\n",  1,  1);
    printf("%4d  %4x\n",  2,  2);
    printf("%4d  %4x\n",  3,  3);
    printf("%4d  %4x\n",  4,  4);
    printf("%4d  %4x\n",  5,  5);
    printf("%4d  %4x\n",  6,  6);
    printf("%4d  %4x\n",  7,  7);
    printf("%4d  %4x\n",  8,  8);
    printf("%4d  %4x\n",  9,  9);
    printf("%4d  %4x\n", 10, 10);
    printf("%4d  %4x\n", 11, 11);
    printf("%4d  %4x\n", 12, 12);
    printf("%4d  %4x\n", 13, 13);
    printf("%4d  %4x\n", 14, 14);
    printf("%4d  %4x\n", 15, 15);
    printf("%4d  %4x\n", 16, 16);
    printf("%4d  %4x\n", 17, 17);
    printf("%4d  %4x\n", 18, 18);
    printf("%4d  %4x\n", 19, 19);
    printf("%4d  %4x\n", 20, 20);
    printf("%4d  %4x\n", 21, 21);
    printf("%4d  %4x\n", 22, 22);
    printf("%4d  %4x\n", 23, 23);
    printf("%4d  %4x\n", 24, 24);
    printf("%4d  %4x\n", 25, 25);
    printf("%4d  %4x\n", 26, 26);
    printf("%4d  %4x\n", 27, 27);
    printf("%4d  %4x\n", 28, 28);
    printf("%4d  %4x\n", 29, 29);
    printf("%4d  %4x\n", 30, 30);
    printf("%4d  %4x\n", 31, 31);
```

Ex1 - (b)

```
    printf("%4d  %4x\n", 0x00, 0x00);
    printf("%4d  %4x\n", 0x01, 0x01);
    printf("%4d  %4x\n", 0x02, 0x02);
    printf("%4d  %4x\n", 0x03, 0x03);
    printf("%4d  %4x\n", 0x04, 0x04);
    printf("%4d  %4x\n", 0x05, 0x05);
    printf("%4d  %4x\n", 0x06, 0x06);
    printf("%4d  %4x\n", 0x07, 0x07);
    printf("%4d  %4x\n", 0x08, 0x08);
    printf("%4d  %4x\n", 0x09, 0x09);
    printf("%4d  %4x\n", 0x0a, 0x0a);
    printf("%4d  %4x\n", 0x0b, 0x0b);
    printf("%4d  %4x\n", 0x0c, 0x0c);
    printf("%4d  %4x\n", 0x0d, 0x0d);
    printf("%4d  %4x\n", 0x0e, 0x0e);
    printf("%4d  %4x\n", 0x0f, 0x0f);

}
```

Ex1 - (c)

0	0	16	10	0	0
1	1	17	11	1	1
2	2	18	12	2	2
3	3	19	13	3	3
4	4	20	14	4	4
5	5	21	15	5	5
6	6	22	16	6	6
7	7	23	17	7	7
8	8	24	18	8	8
9	9	25	19	9	9
10	a	26	1a	10	a
11	b	27	1b	11	b
12	c	28	1c	12	c
13	d	29	1d	13	d
14	e	30	1e	14	e
15	f	31	1f	15	f

Ex2 - (a)

```
#include <stdio.h>

int main(void)
{
    printf("%4d  %4x\n",  0,  0);
    printf("%4d  %4x\n", -1, -1);
    printf("%4d  %4x\n", -2, -2);
    printf("%4d  %4x\n", -3, -3);
    printf("%4d  %4x\n", -4,  4);
    printf("%4d  %4x\n", -5, -5);
    printf("%4d  %4x\n", -6, -6);
    printf("%4d  %4x\n", -7, -7);
    printf("%4d  %4x\n", -8, -8);
    printf("%4d  %4x\n", -9, -9);
    printf("%4d  %4x\n",-10,-10);
    printf("%4d  %4x\n",-11,-11);
    printf("%4d  %4x\n",-12,-12);
    printf("%4d  %4x\n",-13,-13);
    printf("%4d  %4x\n",-14,-14);
    printf("%4d  %4x\n",-15,-15);
    printf("%4d  %4x\n",-16,-16);
    printf("%4d  %4x\n",-17,-17);
    printf("%4d  %4x\n",-18,-18);
    printf("%4d  %4x\n",-19,-19);
    printf("%4d  %4x\n",-20,-20);
    printf("%4d  %4x\n",-21,-21);
    printf("%4d  %4x\n",-22,-22);
    printf("%4d  %4x\n",-23,-23);
    printf("%4d  %4x\n",-24,-24);
    printf("%4d  %4x\n",-25,-25);
    printf("%4d  %4x\n",-26,-26);
    printf("%4d  %4x\n",-27,-27);
    printf("%4d  %4x\n",-28,-28);
    printf("%4d  %4x\n",-29,-29);
    printf("%4d  %4x\n",-30,-30);
    printf("%4d  %4x\n",-31,-31);
```

Ex2 - (b)

```
    printf("%4d  %4x\n",-0x00,-0x00);
    printf("%4d  %4x\n",-0x01,-0x01);
    printf("%4d  %4x\n",-0x02,-0x02);
    printf("%4d  %4x\n",-0x03,-0x03);
    printf("%4d  %4x\n",-0x04,-0x04);
    printf("%4d  %4x\n",-0x05,-0x05);
    printf("%4d  %4x\n",-0x06,-0x06);
    printf("%4d  %4x\n",-0x07,-0x07);
    printf("%4d  %4x\n",-0x08,-0x08);
    printf("%4d  %4x\n",-0x09,-0x09);
    printf("%4d  %4x\n",-0x0a,-0x0a);
    printf("%4d  %4x\n",-0x0b,-0x0b);
    printf("%4d  %4x\n",-0x0c,-0x0c);
    printf("%4d  %4x\n",-0x0d,-0x0d);
    printf("%4d  %4x\n",-0x0e,-0x0e);
    printf("%4d  %4x\n",-0x0f,-0x0f);

}
```

Ex2 - (c)

0	0	-16	fffffff0	0	0
-1	ffffffff	-17	ffffffef	-1	ffffffff
-2	fffffffe	-18	ffffffee	-2	fffffffe
-3	fffffffd	-19	ffffffed	-3	fffffffd
-4	fffffffc	-20	ffffffec	-4	fffffffc
-5	fffffffb	-21	ffffffeb	-5	fffffffb
-6	fffffffa	-22	ffffffea	-6	fffffffa
-7	fffffff9	-23	ffffffe9	-7	fffffff9
-8	fffffff8	-24	ffffffe8	-8	fffffff8
-9	fffffff7	-25	ffffffe7	-9	fffffff7
-10	fffffff6	-26	ffffffe6	-10	fffffff6
-11	fffffff5	-27	ffffffe5	-11	fffffff5
-12	fffffff4	-28	ffffffe4	-12	fffffff4
-13	fffffff3	-29	ffffffe3	-13	fffffff3
-14	fffffff2	-30	ffffffe2	-14	fffffff2
-15	fffffff1	-31	ffffffe1	-15	fffffff1

Ex3 - (a)

```
#include <stdio.h>
#include <limits.h>

int main(void) {

  printf("CHAR_BIT     = %d \n",   CHAR_BIT    );
  printf(".....................................\n");
  printf("SCHAR_MIN    = %d \n",   SCHAR_MIN   );
  printf("-(1<<7)      = %d \n",   -(1<<7)     );
  printf("SCHAR_MAX    = %d \n",   SCHAR_MAX   );
  printf("+(1<<7)-1    = %d \n",   +(1<<7)-1   );
  printf("UCHAR_MAX    = %d \n",   UCHAR_MAX   );
  printf("+(1<<8)-1    = %d \n",   +(1<<8)-1   );
  printf(".....................................\n");
  printf("CHAR_MIN     = %d \n",   CHAR_MIN    );
  printf("-(1<<7)      = %d \n",   -(1<<7)     );
  printf("CHAR_MAX     = %d \n",   CHAR_MAX    );
  printf("+(1<<7)-1    = %d \n",   +(1<<7)-1   );
  printf("UCHAR_MAX    = %d \n",   UCHAR_MAX   );
  printf(".....................................\n");
```

Ex3 - (b)

```
printf("..................................\n");
printf("SHRT_MIN     = %d \n",   SHRT_MIN    );
printf("-(1<<15)     = %d \n",   -(1<<15)    );
printf("SHRT_MAX     = %d \n",   SHRT_MAX    );
printf("+(1<<15)-1   = %d \n",   +(1<<15)-1  );
printf("USHRT_MAX    = %d \n",   USHRT_MAX   );
printf("+(1<<16)-1   = %d \n",   +(1<<16)-1  );
printf("..................................\n");
printf("INT_MIN      = %d \n",   INT_MIN     );
printf("-(1L<<31)    = %ld \n",  -(1L<<31)   );
printf("INT_MAX      = %d \n",   INT_MAX     );
printf("+(1L<<31)-1  = %ld \n",  +(1L<<31)-1 );
printf("UINT_MAX     = %u \n",   UINT_MAX    );
printf("+(1L<<32)-1  = %ld \n",  +(1L<<32)-1 );
printf("..................................\n");
printf("LONG_MIN     = %ld \n",  LONG_MIN    );
printf("LONG_MAX     = %ld \n",  LONG_MAX    );
printf("ULONG_MAX    = %lu \n",  ULONG_MAX   );
printf("..................................\n");
printf("LLONG_MIN    = %lld \n", LLONG_MIN   );
printf("LLONG_MAX    = %lld \n", LLONG_MAX   );
printf("ULLONG_MAX   = %llu \n", ULLONG_MAX  );
```

}

Ex3 - (c)

```
CHAR_BIT      = 8
.....................................
SCHAR_MIN     = -128
-(1<<7)       = -128
SCHAR_MAX     = 127
+(1<<7)-1     = 127
UCHAR_MAX     = 255
+(1<<8)-1     = 255
.....................................
CHAR_MIN      = -128
-(1<<7)       = -128
CHAR_MAX      = 127
+(1<<7)-1     = 127
UCHAR_MAX     = 255
.....................................
MB_LEN_MAX    = 16
```

Ex3 - (d)

```
.....................................
SHRT_MIN      = -32768
-(1<<15)      = -32768
SHRT_MAX      = 32767
+(1<<15)-1    = 32767
USHRT_MAX     = 65535
+(1<<16)-1    = 65535
.....................................
INT_MIN       = -2147483648
-(1L<<31)     = -2147483648
INT_MAX       = 2147483647
+(1L<<31)-1   = 2147483647
UINT_MAX      = 4294967295
+(1L<<32)-1   = 4294967295
.....................................
LONG_MIN      = -9223372036854775808
LONG_MAX      = 9223372036854775807
ULONG_MAX     = 18446744073709551615
.....................................
LLONG_MIN     = -9223372036854775808
LLONG_MAX     = 9223372036854775807
ULLONG_MAX    = 18446744073709551615
```