CS 241
Data Organization
Solution for Lab 3: getbits

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getbits.c: headers and getbits

```c
#include <stdio.h>

#define MAX_UINT_VAL 4294967295L
#define MAX_BITS 31

int error = 0;
int done = 0;

unsigned getbits(unsigned x, int p, int n)
{
  return (x >>(p+1-n)) & ~(~0 << n);
}
```

getbits.c: readInt

```
unsigned int readInt(long max)
{ long num = 0;
  char c = getchar();
  while (c != ';' && c != '\n' && c != EOF)
  { if (error == 0)
    { if (c >= '0' && c <= '9')
      { num = num * 10 + c -'0';
        if (num > max) error = 1;
      }
      else error=1;
    }
    c=getchar();
  }
  if (c==EOF) done = 1;
  return (unsigned int) num;
}
```

Lines 7,8: long is 64 bits, so okay to append extra digit before checking if num greater than max

getbits.c: main

```
void main(void)
{ while (!done)
  { int p = (int)readInt(MAX_BITS);
    int n = (int)readInt(MAX_BITS);
    unsigned int x = readInt(MAX_UINT_VAL);
    if (done) break;

    if (n > p+1) error = 1;

    if (error) printf("Error\n");
    else
    { printf("getbits(x=%u, p=%d, n=%d) = %u\n",
             x, p, n, getbits(x,p,n));
    }
    error=0;
  }
}
```