Problems for 29 May 2019

1) Copy the “hello world” program from /u/csc209h/summer/pub/ex/04/hello.c
   Compile and run it.
   (If you’re working on a laptop without network access, you can just type it in, it’s not long.)

2) Write a C program which implements the “rot13” transformation (which is an encryption and
   also the decryption): letters are “rotated” 13 places along the alphabet, and non-letters are
   copied unaltered. Your program reads from the standard input with getchar() and writes to the
   standard output with putchar().
   
   So you add 13 to characters between ‘a’ and ‘m’ inclusive, as well as to characters
   between ‘A’ and ‘M’ inclusive; and you subtract 13 from characters between ‘n’ and ‘z’
   inclusive, as well as from characters between ‘N’ and ‘Z’ inclusive.

3) Write an “integer square root” program which works by binary search: Read an integer from
   the standard input (don’t print a prompt), and guess that its square root is half the number, and by
   squaring the guessed square root, go higher or lower using the usual binary search algorithm.
   The integer square root of \( n \) is the value \( x \) such that \( x^2 \leq n < (x + 1)^2 \).

3b) Write a loop in sh which uses your solution for question 3 to find the largest integer whose
    integer square root is 12. (answer: 168)

3c) Modify your 3a program to print a prompt. Try it interactively. Then run your 3b shell script
    to demonstrate why we don’t print prompts when writing software tools!