Quiz 2

Software Systems
Spring 2019

This quiz is open book, open notes, open laptop. You may run the C compiler, but don’t spend too much time debugging.

1. Write a function named `strsplit` that splits a string into two strings. It should take the following parameters:

   - `char *string`: The string to be split.
   - `char sep`: The separator character.
   - `char *first`: The buffer where the first part should be stored.
   - `char *second`: The buffer where the second part should be stored.

   For example, if `string` is `Hello World` and `sep` is a space character, `first` should be `Hello` and `second` should be `World`. Both results should be null-terminated.

   The first instance of `sep` should not appear in the results; any subsequent instances should.

   You don’t have to do any error checking. You can assume that `string` contains at least one instance of `sep`, and that the buffers are big enough to contain the results.

   You should not search for or use an online solution to this problem, but you can use any of the functions defined in `string.h`.

   For full credit, your solution must be readable and demonstrably correct.
2. Suppose some lunatic suggests building a virtual memory system with 37-bit addresses.
   
   (a) How many bytes would be needed to store one of these virtual addresses?
   
   (b) How many virtual addresses are there in this space? Write your answer using base 10 scientific notation with at least 3 digits of precision.
   
   (c) Assuming that each address refers to a byte, how big is this virtual address space? Write your answer using appropriate power-of-two units (MiB, GiB, etc.).
   
3. The following program uses Euclid’s algorithm to compute the greatest common divisor of two numbers. Hint: \% is the modulus operator.

```c
int gcd(int a, int b) {
    if (b == 0)
        return a;
    int r = a % b;
    return gcd(b, r);
}

int main() {
    int c = gcd(6, 4);
}
```

Draw a stack diagram that shows the state of the program immediately before it executes `return a`. 