

CS 12 - Lab 9 Recursion

In this lab you will write several recursive functions. Solving a problem recursively breaks down a problem into smaller similar sub-problems. So try and figure out how to break each of the following problems and be sure to include a base case (an ending condition).

1. Write a recursive function that returns the number of digits in an integer. For example, it should return 4 if passed the integer 1126 and should return 1 if passed the integer 0. It should take the form:

```
int num_digits(int num);
```

2. Write a recursive function that prints the equivalent number using a different base. It should be passed an decimal integer (base 10) and should be passed the new base. This is calculated by the following approach:

```
    0  Remainder 1
    -
  2|1  Remainder 1
    -
  2|3  Remainder 0
    -
  2|6  Remainder 1
    --
  2|13  Remainder 0
    --
  2|26
```

Thus, $26 = 11010$ (base 2). The function should take the form:

```
void convert_base(int num, int newbase);
```

3. Write a recursive function that computes the gcd (greatest common divisor) of two integers. The gcd is defined as:

```
gcd(m,n) = n                                if m is divisible by n
gcd(m,n) = gcd(n, remainder of m divided by n)  otherwise
```