

day-5-mini-project

September 6, 2023

1 Day 5 Mini Project I

1.1 Part I

1. Calculating the Fibonacci sequence The Fibonacci sequence is defined by the recursive sequence:

$$F(n) = F(n-1) + F(n-2)$$

With $F(0) = 0$, $F(1) = 1$ and $n > 2$.

Write a program which calculates the k^{th} Fibonacci number by recursively evaluating the sequence above.

```
[ ]: //// fib.c

int main(void) {
    return 0;
}
```

2. Golden ratio approximation The golden ratio is the irrational constant with the value:

$$\varphi = \frac{1 + \sqrt{5}}{2} \approx 1.618033988749$$

It can be expressed as an infinite continued fraction:

$$\varphi = 1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{1 + \dots}}}}$$

Write a program which approximates φ by recursively evaluating the continued fraction, with a starting guess of 1.0. Your program should approximate φ to a precision of 1 part in 10^{12} . How many recursive calls does this require?

```
[ ]: //// phi.c

int main(void) {
    return 0;
}
```

```
}
```

1.2 Part II

Write a function to concatenate an array of strings together into a single null-terminated string, with the individual sub-strings separated by a given character. The function should have the signature `char *join_strings(const char **strings, int num_strings, char sep)`. It should return the address of the start of the concatenated strings. The parameters are:

- `strings` is an array of pointers to `const char` (i.e. an array of constant strings) to be concatenated together.
- `num_strings` is the number of entries in `strings`.
- `sep` is the separator to use between successive strings in the result. If `sep` is `'\0'`, no separator should be added.

For example, given the input strings "Foo", "Bar" and "Baz" and the separator ':' your function should return the string "Foo:Bar:Baz".

```
[ ]: //// join_strings.c
      #include <stdio.h>

      int main(void) {
          return 0;
      }
```