Cody Adams

CSC 375-01

Homework 2

2.8, 2.9, 2.12, 2.15, 2.17, 2.19, 2.20, 2.35

2.8) long NoRecurFact (int num)

{

long Fact = 1;

for ( int x=1; x <= n; x++ )

Fact = Fact \* x;

return Fact;

}

2.9) template <class Elem> void permute( Elem \* array[], int x )

{

swap( array, x - 1, Random(x) );

permute( array, x - 1 )  
}

2.10) a) I think version 1 is easier to understand

b) Fibr() is slower because for each value passed to it, it (twice) calls itself until the value is 1 or 2, where Fibi() runs only once per call, and the maximum number of iterations inside it is 3.

2.12) Using real numbers, foo() would run indefinitely, as val 🡪 0, in a program, it would eventually terminate due to precision loss at some point.

2.15) Assume the largest possible prime is P

Given the series is not divisable by any, thus is a new prime.

2.17) at n, n = (n-1+1) = (n-0), n=n=n

2.19) Prove: ; Base Case: for n=1, .

Assume:

Proof:

= , The assumption holds.

2.20) Prove: Base Case: For *n* = 0, 20 = 21 *−* 1 = 1.

Assume:

Proof: , assumption holds.

2.35) Assuming the average number of pages per book is 200, I would need 5000 books in my house. I do not have this many books. Assuming the average pages per book in the UM-Flint library is 600, and the library has 400,000 books, the library has 240 million pages.

P.10) Consider this recursive function to compute the Fibonacci sequence (based on problem 2.10):

long fib(int n)

{

// error-checking omitted

if ((n == 1) || (n == 2)) return 1;

return fib(n-1) + fib(n-2);

}

P.11) Assuming MSB 104 dimensions (in feet) of 20x20x100, with an extra space in the ceiling of 40 cu ft, the total volume of MSB 104 is 40040 cu ft. A basketball has volume of 3.875 cu ft. It would take 10333 basketballs to fill 104 MSB.

P.12) Assuming the path used to circumnavigate the Um-Flint campus on foot is 6.5 miles and the average student travels at 5 miles per hours, it would take 1.3 hours to walk completely around UM-Flint. Assuming the route the campus shuttle takes is 15 miles and the shuttle has fuel efficiency of 15 miles per gallon, walking by foot would save one gallon, but because the shuttle runs whether you walk or not, you actually save no gas.

P.13) Consider traveling 100 miles—the truck originally needed 10 gallons, and would only need 5 after the improvement, a savings of 5 gallons. The Impala needed 3.33 gallons, and now needs 2, an improvement of 1.33 gallons. Improving the truck would make a bigger difference, but Detroit doesn’t care anyway.