Assignment 13

More recursion

#include <stdio.h>

// Recursive function to calculate the sum of the first N natural numbers

int sumOfNaturals(int N) {

if (N == 1) {

return 1;

} else {

return N + sumOfNaturals(N - 1);

}

}

// Recursive function to calculate the sum of the first N odd natural numbers

int sumOfOddNaturals(int N) {

if (N == 1) {

return 1;

} else {

return (2 \* N - 1) + sumOfOddNaturals(N - 1);

}

}

// Recursive function to calculate the sum of the first N even natural numbers

int sumOfEvenNaturals(int N) {

if (N == 1) {

return 2;

} else {

return (2 \* N) + sumOfEvenNaturals(N - 1);

}

}

// Recursive function to calculate the sum of squares of the first N natural numbers

int sumOfSquares(int N) {

if (N == 1) {

return 1;

} else {

return N \* N + sumOfSquares(N - 1);

}

}

// Recursive function to calculate the sum of digits of a given number

int sumOfDigits(int number) {

if (number == 0) {

return 0;

} else {

return (number % 10) + sumOfDigits(number / 10);

}

}

// Recursive function to calculate the factorial of a given number

int factorial(int num) {

if (num == 0 || num == 1) {

return 1;

} else {

return num \* factorial(num - 1);

}

}

// Recursive function to calculate the HCF of two numbers

int hcf(int a, int b) {

if (b == 0) {

return a;

} else {

return hcf(b, a % b);}

}

// Recursive function to calculate the power of a number

int power(int base, int exponent) {

if (exponent == 0) {

return 1;

} else {

return base \* power(base, exponent - 1);}

}

// Recursive function to print the first N terms of the Fibonacci series

void fibonacci(int N, int a, int b, int count) {

if (count < N) {

printf("%d ", a);

fibonacci(N, b, a + b, count + 1);}

}

// Recursive function to count the digits of a given number

int countDigits(int number) {

if (number == 0) {

return 0;

} else {

return 1 + countDigits(number / 10);}

}

// Driver

int main() {

int N, num1, num2, number, base, exponent;

printf("Enter N for sum of natural numbers: ");

scanf("%d", &N);

printf("Sum of first %d natural numbers: %d\n\n", N, sumOfNaturals(N));

printf("Enter N for sum of odd natural numbers: ");

scanf("%d", &N);

printf("Sum of first %d odd natural numbers: %d\n\n", N, sumOfOddNaturals(N));

printf("Enter N for sum of even natural numbers: ");

scanf("%d", &N);

printf("Sum of first %d even natural numbers: %d\n\n", N, sumOfEvenNaturals(N));

printf("Enter N for sum of squares of natural numbers: ");

scanf("%d", &N);

printf("Sum of squares of first %d natural numbers: %d\n\n", N, sumOfSquares(N));

printf("Enter a number to calculate the sum of its digits: ");

scanf("%d", &number);

printf("Sum of digits of %d: %d\n\n", number, sumOfDigits(number));

printf("Enter a number to calculate its factorial: ");

scanf("%d", &num1);

printf("Factorial of %d: %d\n\n", num1, factorial(num1));

printf("Enter two numbers to calculate their HCF: ");

scanf("%d %d", &num1, &num2);

printf("HCF of %d and %d: %d\n\n", num1, num2, hcf(num1, num2));

printf("Enter N to print the first N terms of the Fibonacci series: ");

scanf("%d", &N);

printf("Fibonacci series: ");

fibonacci(N, 0, 1, 0);

printf("\n\n");

printf("Enter a number to count its digits: ");

scanf("%d", &number);

printf("Number of digits in %d: %d\n\n", number, countDigits(number));

printf("Enter a base number: ");

scanf("%d", &base);

printf("Enter an exponent: ");

scanf("%d", &exponent);

printf("%d^%d: %d\n\n", base, exponent, power(base, exponent));

return 0;

}

