Assignment 12

Recursion in C

#include <stdio.h>

// Recursive function to print first N natural numbers

void printNaturalNumbers(int N, int current) {

if (current <= N) {

printf("%d ", current);

printNaturalNumbers(N, current + 1);

}

}

// Recursive function to print first N natural numbers in reverse order

void printNaturalNumbersReverse(int N) {

if (N > 0) {

printf("%d ", N);

printNaturalNumbersReverse(N - 1);

}

}

// Recursive function to print first N odd natural numbers

void printOddNaturalNumbers(int N, int current) {

if (current <= N) {

printf("%d ", 2 \* current - 1);

printOddNaturalNumbers(N, current + 1);

}

}

// Recursive function to print first N odd natural numbers in reverse order

void printOddNaturalNumbersReverse(int N) {

if (N > 0) {

printf("%d ", 2 \* N - 1);

printOddNaturalNumbersReverse(N - 1);}

}

// Recursive function to print first N even natural numbers

void printEvenNaturalNumbers(int N, int current) {

if (current <= N) {

printf("%d ", 2 \* current);

printEvenNaturalNumbers(N, current + 1);

}

}

// Recursive function to print first N even natural numbers in reverse order

void printEvenNaturalNumbersReverse(int N) {

if (N > 0) {

printf("%d ", 2 \* N);

printEvenNaturalNumbersReverse(N - 1);

}

}

// Recursive function to print squares of first N natural numbers

void printSquares(int N, int current) {

if (current <= N) {

printf("%d ", current \* current);

printSquares(N, current + 1);}

}

// Recursive function to print binary of a given decimal number

void printBinary(int decimal) {

if (decimal > 0) {

printBinary(decimal / 2);

printf("%d", decimal % 2);

}

}

// Recursive function to print octal of a given decimal number

void printOctal(int decimal) {

if (decimal > 0) {

printOctal(decimal / 8);

printf("%d", decimal % 8);

}

}

// Recursive function to print the reverse of a given number

void printReverse(int number) {

if (number == 0) {

return;

}

printf("%d", number % 10);

printReverse(number / 10);

}

// Driver

int main() {

int N, decimalNumber;

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

scanf("%d", &N);

printf("First %d natural numbers: ", N);

printNaturalNumbers(N, 1);

printf("\n\n");

printf("Enter N for natural numbers in reverse order: ");

scanf("%d", &N);

printf("First %d natural numbers in reverse order: ", N);

printNaturalNumbersReverse(N);

printf("\n\n");

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

scanf("%d", &N);

printf("First %d odd natural numbers: ", N);

printOddNaturalNumbers(N, 1);

printf("\n\n");

printf("Enter N for odd natural numbers in reverse order: ");

scanf("%d", &N);

printf("First %d odd natural numbers in reverse order: ", N);

printOddNaturalNumbersReverse(N);

printf("\n\n");

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

scanf("%d", &N);

printf("First %d even natural numbers: ", N);

printEvenNaturalNumbers(N, 1);

printf("\n\n");

printf("Enter N for even natural numbers in reverse order: ");

scanf("%d", &N);

printf("First %d even natural numbers in reverse order: ", N);

printEvenNaturalNumbersReverse(N);

printf("\n\n");

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

scanf("%d", &N);

printf("Squares of first %d natural numbers: ", N);

printSquares(N, 1);

printf("\n\n");

printf("Enter a decimal number to convert to binary: ");

scanf("%d", &decimalNumber);

printf("Binary representation: ");

printBinary(decimalNumber);

printf("\n\n");

printf("Enter a decimal number to convert to octal: ");

scanf("%d", &decimalNumber);

printf("Octal representation: ");

printOctal(decimalNumber);

printf("\n\n");

printf("Enter a number to print its reverse: ");

scanf("%d", &decimalNumber);

printf("Reverse of the number: ");

printReverse(decimalNumber);

}

