Algorithms, Flowcharts and problem solving

Mid Term Exam

1. Create an algorithm to separate digits of a positive integer number and print the digits backward.

Example:

Input 71802

Output 20817

INPUT

1. Declare N1 (original number).
2. Declare N2 (digit backward number).

PROCESS

1. Get the length of the number.
2. Check if the number is greater than cero.
3. Set N2=0.
4. Multiply N2 by 10
5. Add the result by the reminder of N1 by 10
6. Set N1 as the result of dividing N1 by 10
7. Start again in step (2) in PROCESS

OUTPUT

1. Print digit backward number

let N;

let NR;

NR=0;

for (N=12345;N>0;N/10) {

NR=NR\*10+N%10;

}

console.log("Original number : "+N+" Digits backward : "+NR);

1. Create an algorithm that find the smallest coefficient of 7 where the remainder of its division to 2, 3, 4, 5, and 6 is 1.

Hint: when you divide this number to 2, 3, 4, 5, 6 respectively the remainder of it should be 1.

INPUT

1. Declare N (original number).

PROCESS

1. Set N=7
2. Divide 7 by 1 until 6
3. Check if the remainder is cero
4. If yes store the number
5. Check for the smallest number of the stored ones.

OUTPUT

1. Print the smallest coefficient

let N;

let c;

let temp;

N=7;

temp=N;

for (c=1;c<=N;c++) {

if(N%c==1)

if (c<temp) {

temp=c;

}

}

console.log("The smallest coefficient of 7 is : "+temp);

1. Create an algorithm to get the length for a base edge and a height of a hexagonal prism and calculate the total area of the hexagonal prism.

INPUT

1. Declare height (h).
2. Declare base edge (a).
3. Declare the surface area (S)

PROCESS

1. Set “a” and “h”.
2. Get the surface area S=6ah+3\*sqrt(3)\*a^2

OUTPUT

1. Print Surface Area S

let h;

let a;

let S;

h=3;

a=4;

S=6\*a\*h+3\*Math.sqrt(3)\*Math.pow(a,2);

console.log("The surface of the hexagonal prism is : "+S);

1. Create an algorithm to convert a binary number to a decimal number

INPUT

1. Declare binary number (b)
2. Declare decimal number(d)
3. Declare temporary variables(temp, bp)

PROCESS

1. Set “b” with the binary number and “d=0”.
2. Do the next step while the binary number is greater than cero
3. Get the first digit of the binary number using the reminder
4. Multiply the reminder by its position in the binary number (2^n)
5. Add the result to the decimal number “d”.
6. Get the next digit by dividing the binary number by 10.
7. Go back to step 2 of PROCESS

OUTPUT

1. Print both numbers

let b;

let bp

let d;

let pot;

let temp;

b=101011;

bp=b;

d=0;

pot=0;

while (true){

if (b==0){

break;

}

else{

temp=b%10;

d+=temp\*Math.pow(2,pot);

b=Math.floor(b/10);

pot++;

}

}

console.log("The binary number is : "+bp+" and the decimal number is : "+d);

Each question has 25 marks