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Kelas	: 1KS3

Praktikum 12A

- Source Code (sebelum modifikasi)

```pascal
program praktikum12A;


Function Sum(x: integer):integer;
Begin
    If x = 1 then
        Sum := 1
    Else
        Sum := x + Sum(x - 1);
End;


begin
    writeln(sum(5));
end.
```

- Output (sebelum modifikasi)

```
Compiling praktikum12A.pas
Linking praktikum12A.exe
13 lines compiled, 0.1 sec, 28768 bytes code, 1316 bytes data
15
-32758
```

- Source Code (setelah modifikasi)

```pascal
program praktikum12A;


Function Sum(x: integer):integer;
Begin
    If x = 0 then
```

```pascal
        Sum := 0
    Else if x > 0 then
        Sum := x + Sum(x - 1)
    Else
        Sum := x + Sum(x + 1);
End;


begin
    writeln(sum(5));
    writeln(sum(-5));
end.
```

- Output (setelah modifikasi)

```
Compiling praktikum12A.pas
Linking praktikum12A.exe
15 lines compiled, 0.1 sec, 28800 bytes code, 1316 bytes data
15
-15
```

Praktikum 12B

- Source Code

```pascal
Program praktikum12B;
uses crt;


var
    menu: byte;
    x, y, hasil: real;

function faktorial(x: real):real;
begin
    if x = 1 then
        faktorial := 1
    else
        faktorial := x * faktorial(x - 1);
end;

function penjumlahan(x, y: real):real;
begin
    penjumlahan := x + y;
end;

function pengurangan(x, y: real):real;
begin
    pengurangan := x - y;
```

```pascal
end;

function perkalian(x, y: real):real;
begin
    perkalian := x * y;
end;

function pembagian(x, y: real):real;
begin
    pembagian := x / y;
end;

begin
    hasil := 0;
    menu := 0;
    while(menu <> 6) do begin
        clrscr;
        writeln('Selamat datang di Kalkulator
Sederhana');
        writeln('Silahkan pilih menu berikut: ');
        writeln('1. Penjumlahan');
        writeln('2. Pengurangan');
        writeln('3. Perkalian');
        writeln('4. Pembagian');
        writeln('5. Faktorial');
```

```pascal
        writeln('6. Delete history');
        writeln('7. Keluar');
        writeln();
        if hasil <> 0 then writeln('History = ',
hasil:0:2);

        write('Pilihan Anda (1-7): ');
readln(menu);
        writeln();

        if menu < 5 then begin
            if hasil = 0 then begin
                write('Masukkan angka pertama: ');
readln(x);
            end
            else x := hasil;
            write('Masukkan angka kedua: ');
readln(y);
        end
        else if menu = 5 then begin
            write('Masukkan angka: '); readln(x);
        end;

        case menu of
            1: hasil := penjumlahan(x, y);
```

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```
            2: hasil := pengurangan(x, y);

            3: hasil := perkalian(x, y);

            4: hasil := pembagian(x, y);

            5: hasil := faktorial(x);

            6: hasil := 0;

            7: exit;

            else exit;

          end;

      end;

end.
```

- Output

```
Selamat datang di Kalkulator Sederhana
Silahkan pilih menu berikut:
1. Penjumlahan
2. Pengurangan
3. Perkalian
4. Pembagian
5. Faktorial
6. Delete history
7. Keluar

History = 5040.00
Pilihan Anda (1-7): 5

Masukkan angka: 7
```

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Praktikum 12C

- Source Code (sebelum modifikasi)

```pascal
program praktikum12C_sebelumModifikasi;

PROCEDURE TULIS_1(banyak : integer; kata :
string);
    begin
        if banyak > 1 then TULIS_1(banyak-1,kata);
        writeln(kata, banyak);
    end;

begin
    TULIS_1(5, 'Cetakan ke ');
end.
```

- Output (sebelum modifikasi)

```
Linking praktikum12C.exe
10 lines compiled, 0.2 sec, 28736 bytes code, 1316 bytes data
Cetakan ke 1
Cetakan ke 2
Cetakan ke 3
Cetakan ke 4
Cetakan ke 5
```

- Source Code (setelah modifikasi)

```pascal
program praktikum12C_setelahModifikasi;

PROCEDURE TULIS_1(banyak : integer; kata :
string);
    begin
```

```pascal
        writeln(kata, banyak);
        if banyak > 1 then TULIS_1(banyak-1,kata);
    end;


begin
    TULIS_1(5, 'Cetakan ke ');
end.
```

- Output

```
Linking praktikum12C.exe
10 lines compiled, 0.1 sec, 28736 bytes code, 1316 bytes data
Cetakan ke 5
Cetakan ke 4
Cetakan ke 3
Cetakan ke 2
Cetakan ke 1
```

Praktikum 12D

- Source Code (function)

```pascal
program penugasan12D_function;
var
    x, i: integer;

function fib(n: integer): integer;
    begin
        if(n = 1) then
            fib := 1
        else if (n = 2) then
            fib := 1
        else
            fib := fib(n - 1) + fib(n - 2);
    end;

begin
    writeln('deret fibonacci');
    write('input value : ');
    readln(x);
    writeln;
    for i := 1 to x do write(fib(i),' ');
    readln;
end.
```

- Output (function)

```
Compiling praktikum12D.pas
Linking praktikum12D.exe
22 lines compiled, 0.1 sec, 31024 bytes code, 1332 bytes data
deret fibonacci
input value : 8

1 1 2 3 5 8 13 21
```

- Source Code (procedure)

```pascal
program praktikum12D_procedure;

procedure pib(n:integer; var hsl :integer);
    var f1, f2: integer;
    begin
        if(n = 1) or (n = 2) then
            hsl := 1
        else begin
            pib(n - 1, f1);
            pib(n - 2, f2);
            hsl := f1 + f2;
        end;
    end;

var
    x, i: integer;
    hsl: integer;


begin
```

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```pascal
    writeln('Barisan Bilangan Fibonacci');
    write('Jumlah bilangan Fibonnaci yang ingin
ditampilkan : ');
    readln(x); writeln;
    for i := 1 to x do begin
        pib(i, hsl);
        write(hsl, ' ');
    end;
    readln;
End.
```

- Output (procedure)

```
Compiling praktikum12D2.pas
Linking praktikum12D2.exe
27 lines compiled, 0.1 sec, 31024 bytes code, 1332 bytes data
Barisan Bilangan Fibonacci
Jumlah bilangan Fibonnaci yang ingin ditampilkan : 8

1 1 2 3 5 8 13 21
```

- Perbedaan

Workflow dengan menggunakan function :

fib(8) = fib(7) + fib(6)

     fib(7) = fib(6) + fib(5)

          fib(6) = fib(5) + fib(4)

               fib(5) = fib(4) + fib(3)

                    fib(4) = fib(3) + fib(2)

                         fib(3) = fib(2) + fib(1)

                              fib(2) = 1

                              fib(1) = 1

                        fib(3) = 1 + 1 = 2

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$$fib(4) = 2 + 1 = 3$$

$$fib(5) = 3 + 2 = 5$$

$$fib(6) = 5 + 3 = 8$$

$$fib(7) = 8 + 5 = 13$$

$$fib(8) = 13 + 8 = 21$$

Sedangkan, untuk workflow dengan procedure :

for i = 1 to 8

i = 1   -> pib(1, 0)   -> hsl = 1

i = 2   -> pib(2, 1)   -> hsl = 1

i = 3   -> pib(3, 1)

     -> pib(2, 0)

       hsl = 1

     -> pib(1, 0)

       hsl = 1

   hsl = 1 + 1 = 2

i = 4   -> pib(4, 2)

    -> pib(3, 0)

      -> pib(2,0)   -> hsl = 1

      -> pib(1,0)   -> hsl = 1

     hsl = 2

    -> pib(2, 0)   -> hsl = 1

   hsl = 3

i = 5   -> pib(5, 3)

    -> pib(4, 0)

      -> pib(3, 0)   -> hsl = 2

      -> pib(2, 0)   -> hsl = 1

     hsl = 2 + 1 = 3

    -> pib(3, 0)   -> hsl = 2

   hsl = 3 + 2 = 5

i = 6   -> pib(6, 5)

    -> pib(5, 0)

      -> pib(4, 0)   -> hsl = 3

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```
            -> pib(3, 0)    -> hsl = 2
        hsl = 5
      -> pib(4, 0)   -> hsl = 3
      hsl = 8
i = 7   -> pib(7, 8)
      -> pib(6, 0)
            -> pib(5, 0)    -> hsl = 5
            -> pib(4, 0)    -> hsl = 3
        hsl = 5 + 3 = 8
      -> pib(5, 0)   -> hsl = 5
      hsl = 8 + 5 = 13
i = 8   -> pib(8, 13)
      -> pib(7, 0)
            -> pib(6, 0)    -> hsl = 8
            -> pib(5, 0)    -> hsl = 5
        hsl = 13
      -> pib(6, 0)   -> hsl = 8
      hsl = 21
```