

Algoritmitika I

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Perhatikan Potongan Program di bawah ini!

```
int f(int x, int y, int z) {
    int a = x + y;
    int b = y + z;
    int c = x + z;
    return a + b - c;
}
```

1. Tentukan berapa hasil pemanggilan $f(2,9,11)$
2. Diketahui pemanggilan fungsi $f(5,y,2) = 6$ tentukan nilai y yang memenuhi!

$$1. f(\dots, 9, \dots) = 2 \cdot 9$$

$$2. f(\dots, y \dots) = \cancel{6} \quad \underline{= 6} \rightarrow \underline{y = 3}$$

- Subsitusi
- Deret & barisan
- Induksi & deduksi

Anitmatika
Geometri

$$1) \text{ ans} = 9$$

$$a = x + y \quad (1)$$

$$b = y + z \quad (2)$$

$$c = \underline{x + z} \quad (3)$$

$$\text{ret} = a + b - c$$

$$= (x + y) + (y + z) - (x + z)$$

$$= x + y + (y + z - x - z)$$

$$= \cancel{x} + y + y \cancel{- x}$$

$$= \underline{2y} (\dots)$$

Subsitusi

Perhatikan Potongan Program di bawah ini!

```
int f(int x, int y, int z) {  
    int a = x + y;  
    int b = y + z;  
    int c = x + z;  
    return a + b - c;  
}
```

1. Tentukan berapa hasil pemanggilan $f(2,9,11)$
2. Diketahui pemanggilan fungsi $f(5,y,2) = 6$
tentukan nilai y yang memenuhi!

Perhatikan Potongan Program di bawah ini!

```
int g(int x, int y) {
    int a = x;
    int b = a + y;

    x = x + 1; ...
    y = y + 1; ...

    a = a + x; ...
    b = a + b; ...

    return a + b
}
```

$$\begin{aligned} & \overline{q = x} \\ & b = a + y = x + y \\ \\ & x' = x + 1 \\ & y' = y + 1 & 2x+1 \\ \\ & a' = a + x' \rightarrow \underline{x + x + 1} \\ & b' = a' + b \rightarrow \underline{2x+1+x+y} \\ \\ & \text{ret} = a' + b' \rightarrow 2(2x+1) + x + y \\ \\ & \underline{\text{ret}} = \underline{5x + y + 2} \end{aligned}$$

$$\begin{aligned} g(2000, 25) &= 5 \cdot 2000 + 25 + 2 \\ &= \underline{\underline{1027}} \end{aligned}$$

Tentukan berapa hasil pemanggilan $g(2000, 25)$!

$N = 5$

While ($N--$) {

—

Start
x

3 2 1 Stop
0

3

Perhatikan Potongan Program di bawah ini!

```
int a,b;  
void h() {  
    a++;  
    b++;  
    a+=b;  
    b-=a;  
    a*=2;  
    b/=a;  
    a%=3;  
}
```

$$a=20, b=3$$

$$1) a = 21$$

$$2) b = 4$$

$$3) a = 21 + 4 = \boxed{25}$$

$$4) b = 4 - \boxed{25} = -21$$

$$5) a = 25 * 2 = \underline{\underline{50}}$$

$$6) b = -21 / \cancel{50} = 0$$

$$7) a = 50 \bmod 3 = 2$$

Jika mula nilai $a = 20$, dan $b = 3$, tentukan nilai akhir a dan b setelah prosedur $h()$ dijalankan!

$$\underline{\underline{b=0}}, \underline{\underline{a=2}}$$

Perhatikan Potongan Program di bawah ini!

```
int dar(double x, double y) {  
    return (x / y) - int  
}
```

```
int der(double x, double y) {  
    return dar(x, y) * y;  
}
```

```
int dor(double x, double y, int z) {  
    return dar(x * z, y * z);  
}
```

dar = 27, ...
8, ...

$$\left[\frac{a}{b} \right] = \left[\frac{a}{\lfloor b \rfloor} \right]$$

(a)

$$\left[\frac{25}{8,5} \right] = \left[\frac{25}{8} \right]$$

Tentukan kembalian fungsi jika dipanggil $\text{dar}(27.354929893, 8.298399)$!

$$3 + 8,5 > 25 \quad (b)$$
$$\left[\frac{25}{8,5} \right] = \left[2, \dots \right] = 2$$

Perhatikan Potongan Program di bawah ini!

```
int dar(double x, double y) {  
    return x / y;  
}  
  
int der(double x, double y) {  
    return dar(x, y) * y (int); → type  
}  
  
int dor(double x, double y, int z) {  
    return dar(x * z, y * z);  
}
```

der = $\left\lfloor \frac{x}{y} \right\rfloor * \left\lfloor y \right\rfloor$

= $\left\lfloor \frac{27}{8}, \dots \right\rfloor * \left\lfloor 8, \dots \right\rfloor$

= 3 * 8

= 24 BENAR

$\left\lfloor \frac{27}{8} \right\rfloor * \left\lfloor 8 \right\rfloor$
SALAH

Tentukan kembalian fungsi jika dipanggil der(27.354929893, 8.298399)!

Perhatikan Potongan Program di bawah ini!

```
int dar(double x, double y) {  
    return x / y;  
}  
  
int der(double x, double y) {  
    return dar(x, y) * y (int);  
}  
  
int dor(double x, double y, int z) {  
    return dar(x * z, y * z);  
}
```

$$\text{dor}(x, y, z) = \frac{xz}{yz}$$

$$\frac{x}{y} = q \quad = \frac{x}{y}$$

Jika hasil pemanggilan fungsi $\text{dor}(36, y, z) = 9$ tentukan nilai y yang memenuhi

$$\frac{36}{y} = 9$$

$$y = \underline{\underline{4}}$$

Perhatikan Potongan Program di bawah ini!

```
int dar(double x, double y) {  
    return x / y;  
}  
  
int der(double x, double y) {  
    return dar(x, y) * y (int);  
}  
  
int dor(double x, double y, int z) {  
    return dar(x * z, y * z);  
}
```

z tidak berpengaruh

1000 Pasang

Jika hasil pemanggilan fungsi $dor(36, y, z) = 9$ untuk y dan z bilangan bulat , serta $1 \leq z \leq 1000$ ada berapa banyak pasangan y dan z yang memenuhi?

$$\binom{n}{r} = \binom{n-1}{r-1} + \binom{n-1}{r}$$

$$n C_r = \frac{n-1}{r-1} C_{r-1} + \frac{n-1}{r} C_r$$

$$f(n, r)$$

$$f(n, r) =$$

$$f(n-1, r-1) + f(n-1, r)$$

Perhatikan Potongan Program di bawah ini!

```
int kwak(int x, int y) {  
    if(x % y == 0) return 1;  
    return 0;  
}
```

y Faktor dari x
↓
return 1

Banyak Faktor dari

$$10^5 = 2^5 \cdot 5^5$$

$$\begin{aligned}\varphi(10^5) &= (5+1)(5+1) \\ &= \underline{\underline{36}}\end{aligned}$$

Tentukan berapa hasil pemanggilan kwak(100000, 1) + kwak(100000, 2) + kwak(100000, 3) + + kwak(100000, 100000)

Perhatikan Potongan Program di bawah ini!

```
int aduk(int x, int y) {
    while(x > 0) {
        y++;
        x--;
    }
} return y
```

Tentukan berapa hasil pemanggilan aduk(20, 2024)!

$$y_{\text{akhir}} = \underline{\underline{y + x}}$$

aduk (x, y)
↓
 y bertambah 1 sebanyak
 x $1 + x = x$
 $y + \underbrace{1 + 1 + 1 + \dots + 1}_{\text{sebanyak } x}$

$$\begin{aligned}y_{\text{akhir}} &= 2024 + 20 \\&= \underline{\underline{2044}}\end{aligned}$$

Perhatikan Potongan Program di bawah ini!

```
int campur(int x, int y) {  
    int ret = 0;  
    for(int i = 1; i<=x; i++) {  
        ret+=i;  
    }  
    for(int j = 1; j<=y; j++) {  
        ret-j;  
    }  
    return ret;  
}
```

} →
} →

$$\text{ret} = 1 + 2 + 3 + \dots + x$$

$$\text{ret} = - (1 + 2 + 3 + \dots + y)$$

$$\sum_{i=1}^{13} + 14 + 15$$

Tentukan berapa hasil pemanggilan campur(13, 15)!

$$\begin{aligned}\text{ret} &= \sum_{i=1}^{13} - \sum_{i=1}^{15} \\ &= \sum_{i=1}^{13} - \sum_{i=1}^{13} + 4 + 14 + 15 = 29\end{aligned}$$

$$\sum_{i=1}^n i = 1 + 2 + 3 + \dots + n$$

For $\sum t = i$ ($1 \leq i \leq n$)

$$\prod_{i=1}^n i = 1 * 2 * 3 * \dots * n$$

For $\text{mult} * = i$ ($1 \leq i \leq n$)

Perhatikan Potongan Program di bawah ini!

```
int tumpah(int x, int y){  
    int ret = 0;  
    for(int i = 1; i<=x; i++) {  
        for(int j = 1; j<=y; j++) {  
            ret++;  
        }  
    }  
    return ret;  
}
```

Tentukan berapa hasil pemanggilan campur(13, 15)!

$f(x, y)$

Siap i ada j
Sebanyak y
 i Sebanyak $x \rightarrow$
Loop Sebanyak $x y$

ret++ Sebanyak Loop
13 * 15
= 13 * (13 + 2)
= 169 + 26
= 195
≡

```
int pndk(int N, int K) {  
    if (N==1) return 1; else return (pndk(N-1,K)-K-1);  
}
```

$K=3$ \rightarrow konstanta
 ~~$N=1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7$~~

$\begin{matrix} 1 & 2 & 2 & 1 & 4 & 1 \\ N=1 & 2 & 3 & 4 & 5 & 6 & 7 \end{matrix}$

$$P(1, 3) = \underline{1}$$

$$\begin{aligned} P(2, 3) &= P(1, 3) + 2 \bmod 2 + 1 \\ &= (1 + 2) \bmod 2 + 1 = \underline{2} \end{aligned}$$

$$\begin{aligned} P(3, 3) &= (P(2, 3) + 2) \bmod 3 + 1 \\ &= ((1 + 2) \bmod 2 + 1) + 2 \bmod 3 + 1 \end{aligned}$$

$$\begin{aligned} P(4, 3) &= \underline{2} \\ &= (P(3, 3) + 2) \bmod 4 + 1 \\ &= (2 + 2 \bmod 2 + 1) + 1 \end{aligned}$$

Perhatikan Potongan Program di bawah ini!

```
int a,b,c;  
cin>>a>>b>>c;  
int x = 3,y = 2,z = 1;  
a = a + x;  
b = b + y;  
c = c + z;  
  
cout<<a+b+c<<endl;
```

$$6+3-1 \quad C_6$$

$$\ominus C_2 = \delta_{C6}$$

$$(a+x) + (b+y) + (c+z) = 12$$

$$(a+3) + (b+2) + (c+1) = 12$$

$$a+b+c = 12 - 6$$

$$a+b+c = 6$$

* Stars & bars

Jika keluaran yang dihasilkan sama dengan 12 tentukan ada berapa banyak triplet masukan berupa bilangan bulat non-negatif $\langle a, b, c \rangle$ yang mungkin diinput pada program sehingga keluarannya sesuai!

$$\frac{8 * 7}{2} = 28 //$$

$$S_1 = 1$$

$$S_2 = 1 + 2$$

$$S_3 = 1 + 2 + 3$$

⋮

$$\text{ans} = 5050 -$$

$$\sum_{i=1}^{100} S_i$$

```

int merah(int a, int b){
    if(b == 0) return a;
    return merah(a+1, b-1);
}
int biru(int a, int b){
    if(b == 0) return a;
    return biru(a-1, b-1);
}
int kuning(int a, int b){
    if(b == 1) return a;
    return (a+kuning(a, b-1));
}
int hijau(int a, int b){
    if(a - b == 0) return 1;
    return (1+hijau(a-b, b));
}

```

$m(a, b)$, $b(a, b)$, $k(a, b)$,
 $h(a, b)$

Induksi - deduksi

$$m(a, b) = a + 1 * b = a + b$$

$$b(a, b) = a - b$$

$$k(a, b) = a + \underbrace{a + a + \dots + a}_{\text{sebanyak } x}$$

x depends b

sebanyak x

$$b - 1 - 1 - 1 - 1 - 1 \dots - 1 = 1$$

$\overbrace{\quad \quad \quad \quad \quad \quad \quad}^x$

$$a * (b - 1) + a$$

$x = b - \dots = \underline{1}$

$$\cancel{a + b - a + a} = \underline{\underline{a * b}}$$

$$b - (b - 1) \rightarrow \cancel{b - b} + \underline{1}$$

```

int merah(int a, int b){
    if(b == 0) return a;
    return merah(a+1,b-1);
}
int biru(int a, int b){
    if(b == 0) return a;
    return biru(a-1,b-1);
}
int kuning(int a, int b){
    if(b == 1) return a;
    return a+kuning(a,b-1);
}
int hijau(int a, int b){
    if(a - b == 0) return 1;
    return 1+hijau(a-b,b);
}

```

$$\begin{aligned}
 h(a, b) &= \\
 a &= b \\
 a - b - b - b - b \dots &= b \\
 &\quad \searrow \quad \nearrow \\
 &\quad \text{Sebanyak } x \\
 a - bx &= b
 \end{aligned}$$

$$\begin{aligned}
 h(a, b) &= \frac{a}{b} - 1 + 1 \quad a &= b + bx \\
 &= \frac{a}{b}, \quad x &= b(1+x) \\
 &= \frac{a}{b} - 1
 \end{aligned}$$

```
int merah(int a,int b){  
    if(b == 0) return a;  
    return merah(a+1,b-1);  
}  
int biru(int a, int b){  
    if(b == 0) return a;  
    return biru(a-1,b-1);  
}  
int kuning(int a, int b){  
    if(b == 1) return a;  
    return (a+kuning(a,b-1));  
}  
int hijau(int a, int b){  
    if(a - b == 0) return 1;  
    return (1+hijau(a-b,b));  
}
```

$$T / 3 = 9 - \underbrace{3 - 3 - 3}_{\text{sebanyak } 3 \times}$$

```
int merah(int a,int b){  
    if(b == 0) return a;  
    return merah(a+1,b-1);  
}  
int biru(int a, int b){  
    if(b == 0) return a;  
    return biru(a-1,b-1);  
}  
int kuning(int a, int b){  
    if(b == 1) return a;  
    return (a+kuning(a,b-1));  
}  
int hijau(int a, int b){  
    if(a - b == 0) return 1;  
    return (1+hijau(a-b,b));  
}
```

} a/b

```

int main() {
    int res = 0, x;
    for(int i = 1; i<=100 ;i++) {
        for(int j = 1; j<=i; j++) {
            x = merah(i,j) + biru(i,j);
            res += hijau(x,2);
        }
    }
    cout<<res<<endl;
}

```



$$x = (i+j) + (i-j)$$

$$x = 2i$$

$$\text{res} + = \frac{2i}{2}$$

$$\text{res} + = i$$

5050 {
 1
 $2 + 2$
 $3 + 3 + 3$
 \vdots
 $100 + 100 + \dots + 100$

$$\sum_{i=1}^{100} 5050 + \sum_{j=1}^i j$$

$$5050 + \underline{5050 - 1} + 5050 - S_1 + 5050 - 1 - 2 + \dots + 5050 - 5050$$

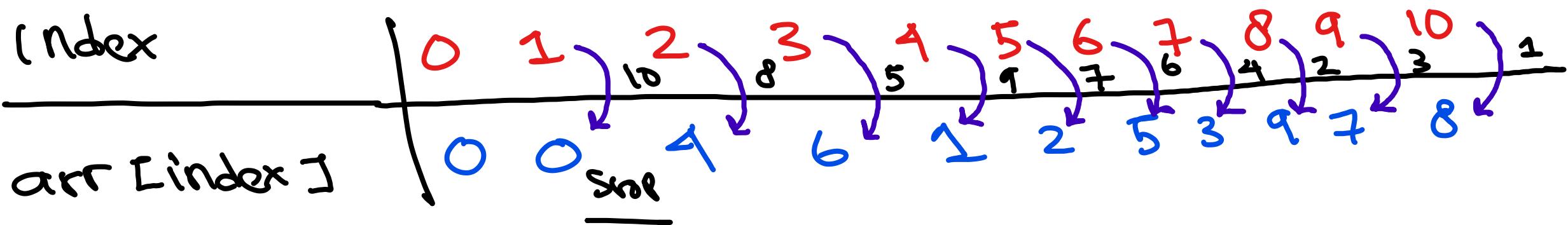
$$5050 + 5050 - 1 + 5050 - 3 + 5050 - 6$$

```

int arr[11] = {0, 0, 4, 6, 1, 2, 5, 3, 9, 7, 8};
int cari(int x, int y=0) {
    if(x == 0) return y;
    return cari(arr[x], y+1);
}

```

- Jika dipanggil $\text{cari}(10)$ tentukan nilai kembalinya! {jawaban berupa angka bulat} **= 10**
- Evaluasi apa yang akan terjadi jika dipanggil fungsi $\text{cari}(12)$?



$\text{cari}(10, 0) \rightarrow \text{cari}(\text{arr}[10], 1)$
 $\text{cari}(8, 1) \rightarrow \text{cari}(\text{arr}[8], 2)$

$\text{ans} = 10,$