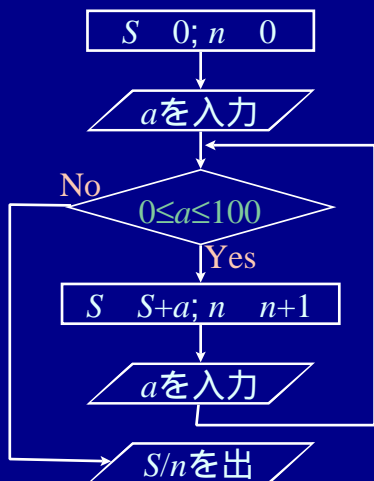


回数の決まっていない繰り返し

- 条件前置型ループ
- 条件後置型ループ
- forループ(c言語)

[例題]

点数をいくつか読み込んでその平均値を出力するプログラム
ただし、データの終わりは異常な値(101以上0未満)とする。



```

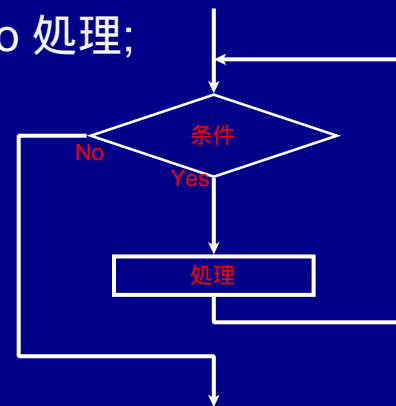
program average(input, output);
var x, n, sum: integer;
begin
  n:=0;
  sum:=0;
  read(x);
  while (x>=0) and (x<=100) do
  begin
    n:=n+1;
    sum:=sum+x;
    read(x)
  end;
  writeln(sum/n)
end.
  
```

```

#include <stdio.h>
int main(void){
  int x, n, sum;
  n=0;
  sum=0;
  scanf("%d", &x);
  while ((x>=0) && (x<=100)){
    n++;
    sum += x;
    scanf("%d", &x);
  }
  printf("%lf\n", (double)sum/(double)n);
  return 0;
}
  
```

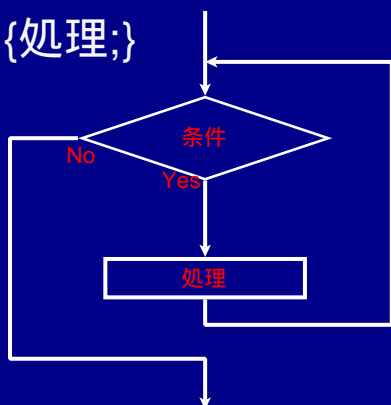
while-do ループ(Pascal)

while 条件 do 処理;



while ループ(c言語)

while (条件) {処理;}



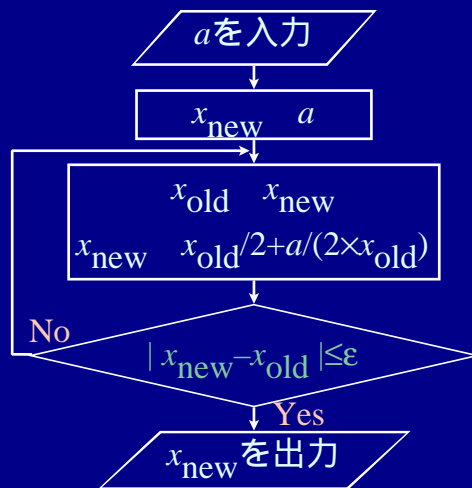
```

PROGRAM AVERAG
INTEGER I, X, N, SUM
N=0
SUM=0
READ(5,*) X
DO 10 I=1, 100000
  IF (X.LT.0).OR.(X.GT.100) THEN
    WRITE(6,*) DFLOAT(SUM)/DFLOAT(N)
    STOP
  END IF
  N=N+1
  SUM=SUM+X
  READ(5,*) X
10 CONTINUE
STOP
END
  
```

[例題]

次の関係を用いて入力した実数の平方根を計算するプログラム

$$\begin{cases} x_0 = a \\ x_{n+1} = \frac{x_n}{2} + \frac{a}{2x_n} \\ \lim_{n \rightarrow \infty} x_n = \sqrt{a} \end{cases}$$



```

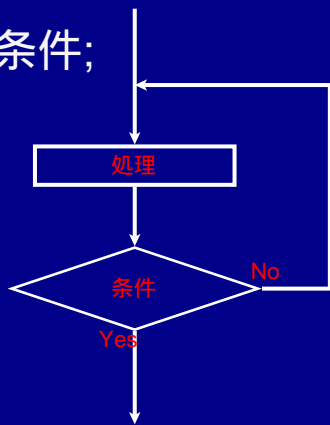
program squreroot(input,output);
const err=0.000001;
var a, xold, xnew: real;
begin
  read(a);
  xnew:=a;
  repeat
    xold:=xnew;
    xnew:=xold/2+a/(2*xold);
  until abs(xnew-xold) < err;
  writeln(xnew)
end.
  
```

```

#include <stdio.h>
#include <math.h>
#define ERR 0.000001
int main(void){
  double a, xold, xnew;
  scanf("%lf", &a);
  xnew=a;
  do {
    xold=xnew;
    xnew=xold/2.0+a/(2.0*xold);
  } while (fabs(xnew-xold) > ERR);
  printf("%lf\n",xnew);
  return 0;
}
  
```

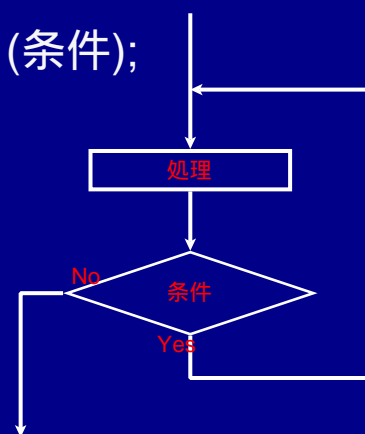
repeat-until ループ(Pascal)

repeat 処理 until 条件;



do-while ループ(c言語)

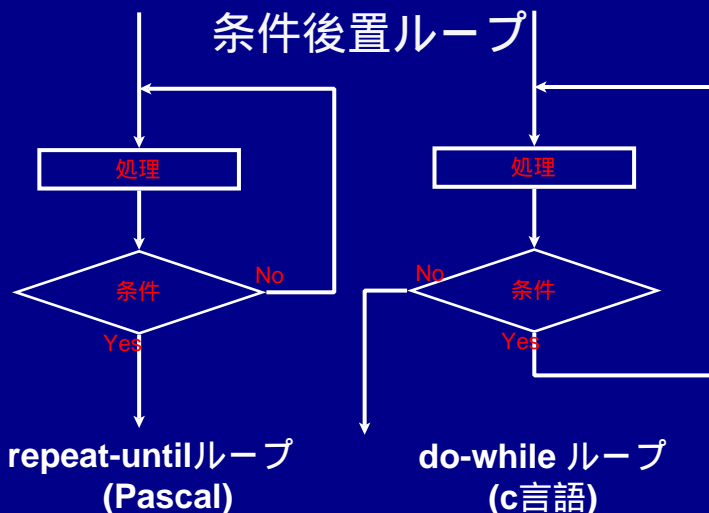
do {処理;} while (条件);

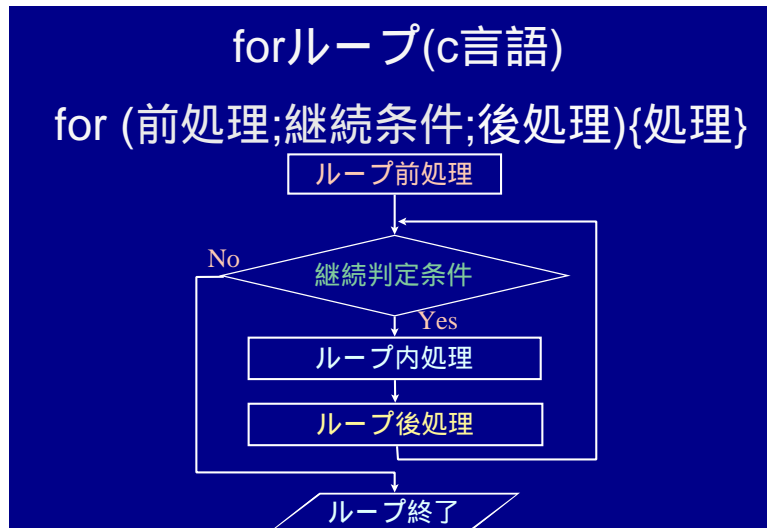
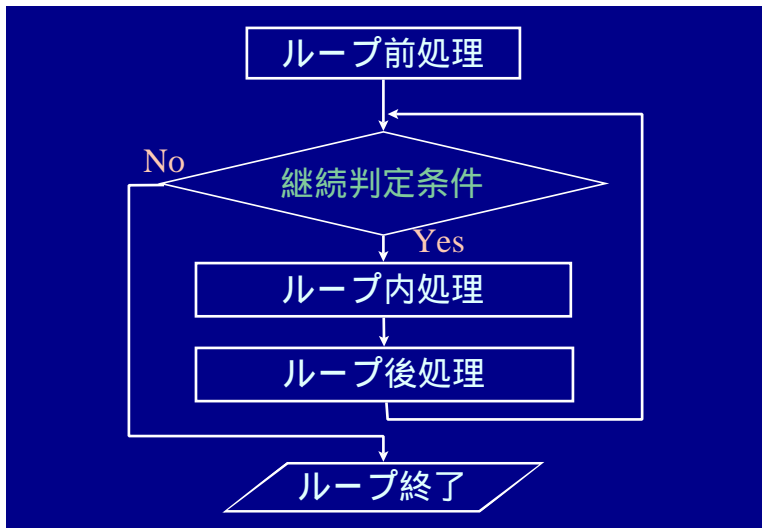
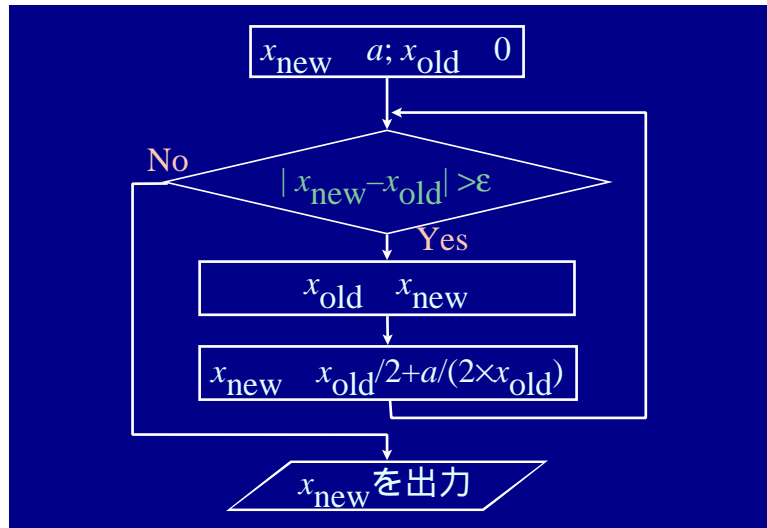
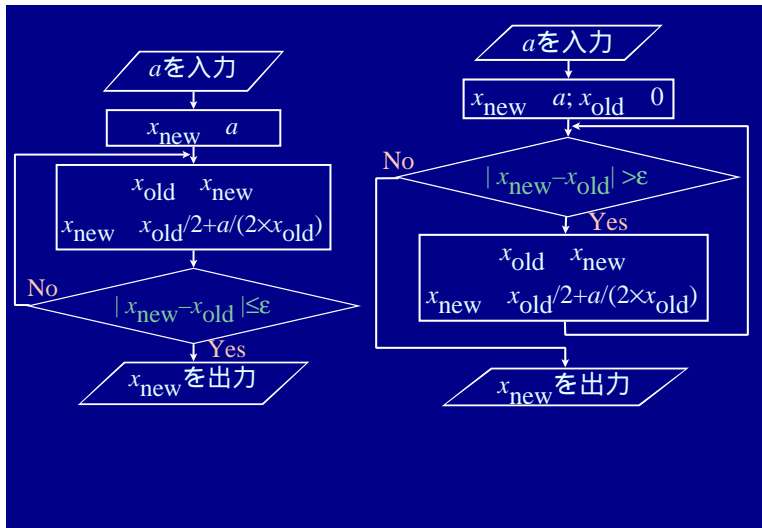
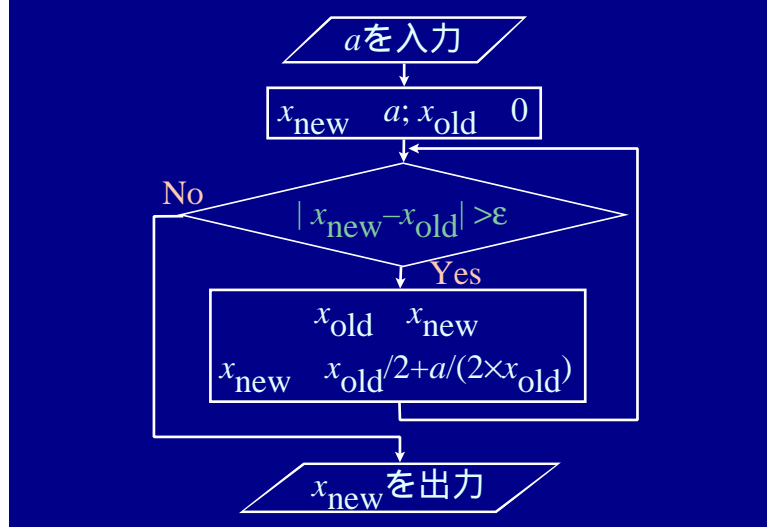
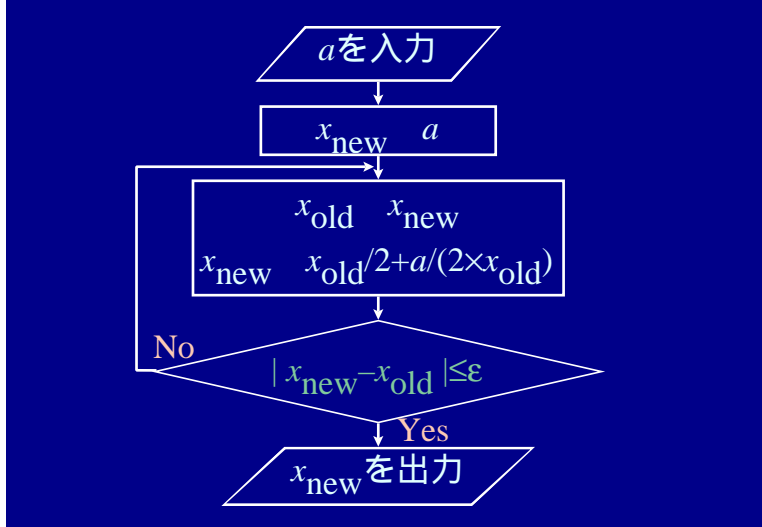


```

PROGRAM SQROOT
PARAMETER (ERR=0.000001D0)
INTEGER I
DOUBLE PRECISION A, XNEW, XOLD
READ(5,*) A
XNEW=A
DO 10 I=1, 100000
  XOLD=XNEW
  XNEW=XOLD/2.D0+A/(2.D0*XOLD)
  IF (DABS(XNEW-XOLD).LE.ERR) THEN
    WRITE(6,*) XNEW
    STOP
  END IF
10 CONTINUE
STOP
END
  
```

条件後置ループ





```

#include <stdio.h>
#include <math.h>
#define ERR 0.000001
int main(void){
    double a,xnew,xold;
    scanf("%lf", &a);
    xnew = a;
    for(xold=0;
        fabs(xnew-xold)>ERR;
        xnew=xold/2.0+a/(2.0*xold))
    {
        xold=xnew;
    }
    printf("%lf\n",xnew);
    return 0;
}
  
```

```

#include <stdio.h>
#include <math.h>
#define ERR 0.000001
int main(void){
    double a,xnew,xold;
    scanf("%lf", &a);
    for(
        xnew = a, xold=0;
        fabs(xnew-xold)>ERR;
        xnew=xold/2.0+a/(2.0*xold),xold=xnew
    ){ }
    printf("%lf\n",xnew);
    return 0;
}
  
```

```
#include <stdio.h>
#include <math.h>
#define ERR 0.000001
int main(void){
    double a,xnew,xold;
    scanf("%lf", &a);
    xnew = a;
    xold=0
    for(; fabs(xnew-xold)>ERR; )
    {
        xold=xnew;
        xnew=xold/2.0+a/(2.0*xold)
    }
    printf("%lf\n",xnew);
    return 0;
}
```

