

pe-1. Pascal を使ってみる

(Pascal プログラミング入門)

URL: <https://www.kkaneko.jp/pro/pascal/index.html>

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本日の内容



例題 1. プログラム実行の体験

- プログラミングを行えるオンラインのサービス

<https://www.onlinegdb.com>

- ウェブブラウザを使う

- たくさんの言語を扱うことができる

Pascal, Python3, Java, C/C++, C#, JavaScript,
R, アセンブリ言語, SQL など

- オンラインなので、「秘密にしたいプログラム」
を扱うには十分な注意が必要

Online GDB で Pascal を動かす手順



① ウェブブラウザを起動する

② 次の URL を開く

<https://www.onlinegdb.com>

A screenshot of a search bar with a magnifying glass icon on the left. The text "https://www.onlinegdb.com" is entered into the search field. The search bar is set against a light gray background.

🔍 <https://www.onlinegdb.com>

③ 「Language」 のところで、「Pascal」 を選ぶ

SPONSOR Slack — Bring your team together with Slack, the collaboration hub for work.

Run Debug Stop Share Save { } Beautify Language -- select --

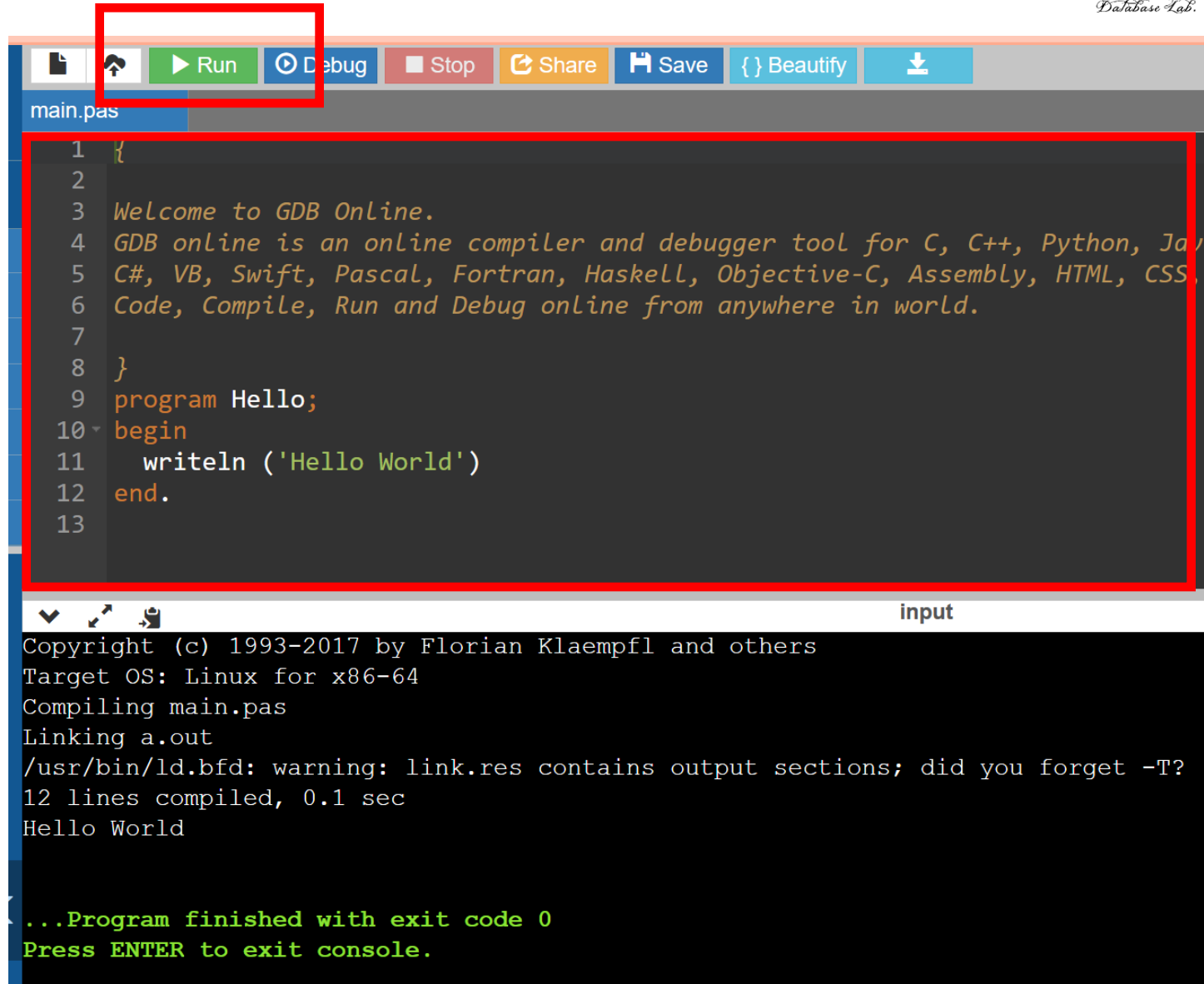
```
1 /*****  
2  
3 Welcome to GDB Online.  
4 GDB online is an online compiler and debugger tool for C, C++, Python  
5 C#, VB, Perl, Swift, Prolog, Javascript, Pascal, HTML, CSS, JS  
6 Code, Compile, Run and Debug online from anywhere in world.  
7  
8 *****/  
9 #include <stdio.h>  
10  
11 int main()  
12 {  
13     printf("Hello World");  
14  
15     return 0;  
16 }  
17
```

Language menu items: -- select --, C, C++, C++ 14, C++ 17, Java, Python, PHP, C#, VB, HTML,JS,CSS, Ruby, Perl, Pascal, R, Fortran, Haskell, Assembly(GCC), Objective C, SQLite

実行ボタン

エディタ画面

プログラムを
書き換えること
ができる



```
main.pas
1 {
2
3 Welcome to GDB Online.
4 GDB online is an online compiler and debugger tool for C, C++, Python, Java,
5 C#, VB, Swift, Pascal, Fortran, Haskell, Objective-C, Assembly, HTML, CSS,
6 Code, Compile, Run and Debug online from anywhere in world.
7
8 }
9 program Hello;
10 begin
11     writeln ('Hello World')
12 end.
13
```

input

```
Copyright (c) 1993-2017 by Florian Klaempfl and others
Target OS: Linux for x86-64
Compiling main.pas
Linking a.out
/usr/bin/ld.bfd: warning: link.res contains output sections; did you forget -T?
12 lines compiled, 0.1 sec
Hello World

...Program finished with exit code 0
Press ENTER to exit console.
```

例題 1. プログラム実行の体験



- コンピュータを役に立つ道具として実感するために、次ページの**プログラム**を使って、**sin 関数の繰り返し計算**を行ってみる

```
program sum;  
var start_x, step_x, x, y:real;  
var i:integer;  
begin
```

```
write('Please Enter start_x:');  
readln(start_x);  
write('Please Enter step_x:');  
readln(step_x);
```

```
for i:=1 to 20 do  
begin  
  x := start_x + ( i * step_x );  
  y := sin(x);  
writeln('sin(', x:8:3, ') =', y:8:3);  
end;  
readln
```

```
end.
```

キーボードからの
データの読み込みを
行っている部分

計算の繰り返しを
行っている部分

画面へのデータの
書き出しを行ってい
る部分

例題 1 のプログラム実行結果



```
main.pas
1 program sum;
2 var start_x, step_x, x, y:real;
3 var i:integer;
4 begin
5   write('Please Enter start_x:');
6   readln(start_x);
7   write('Please Enter step_x:');
8   readln(step_x);
9   for i:=1 to 20 do
10  begin
11    x := start_x + ( i * step_x );
12    y := sin(x);
13    writeln('sin(', x:8:3, ') = ', y:8:3);
14  end;
15  readln
16 end.
```

キーボードから、データ「0.4」と「0.1」を読み込んでいる

```
Copyright (c) 1993-2017 by Florian Klaempfl and others
Target OS: Linux for x86-64
Compiling main.pas
Linking a.out
/usr/bin/ld.bfd: warning: link.res contains output section
17 lines compiled, 0.1 sec
Please Enter start_x:0.4
Please Enter step_x:0.1
sin( 0.500) = 0.479
sin( 0.600) = 0.565
sin( 0.700) = 0.644
sin( 0.800) = 0.717
sin( 0.900) = 0.783
sin( 1.000) = 0.841
sin( 1.100) = 0.891
sin( 1.200) = 0.932
sin( 1.300) = 0.964
sin( 1.400) = 0.985
sin( 1.500) = 0.997
sin( 1.600) = 1.000
sin( 1.700) = 0.992
sin( 1.800) = 0.974
sin( 1.900) = 0.946
sin( 2.000) = 0.909
sin( 2.100) = 0.863
sin( 2.200) = 0.808
sin( 2.300) = 0.746
sin( 2.400) = 0.675
```

計算を 20 回繰り返して、計算結果を表示している

プログラムの機能



プログラムでは、計算等の実行手順を記述

- 計算の繰り返し

計算は自動で**繰り返し**

- キーボードからの読み込み

- 画面への表示

など

例題 1 のプログラムの機能



1. キーボードからのデータの読み込み

次の2つの値を読み込む

start_x, step_x

2. 計算の繰り返し

$\sin(x)$ の計算を20回繰り返す

x = start_x + step_x,
start_x + 2 × step_x,
...
start_x + 20 × step_x

} 20回分

3. 画面へのデータの書き出し

計算した $\sin(x)$ の値を書き出す

実行(1/4)

A screenshot of a code editor interface. The top toolbar contains buttons for Run (green), Debug (blue), Stop (red), Share (orange), Save (blue), Beautify (light blue), and a download icon. The 'Run' button is highlighted with a blue box, and a blue arrow points from it to the code. The code is in Pascal and defines a program named 'sum' that calculates the sine of a sequence of values. The code is as follows:

```
1 program sum;
2 var start_x, step_x, x, y:real;
3 var i:integer;
4 begin
5     write('Please Enter start_x:');
6     readln(start_x);
7     write('Please Enter step_x:');
8     readln(step_x);
9     for i:=1 to 20 do
10    begin
11        x := start_x + ( i * step_x );
12        y := sin(x);
13        writeln('sin(', x:8:3, ') =', y:8:3);
14    end;
15    readln
```

input

Command line arguments:

Standard Input: Interactive Console Text

「Run」をクリック

実行(2/4)



```
main.pas
1 program sum;
2 var start_x, step_x, x, y:real;
3 var i:integer;
4 begin
5     write('Please Enter start_x:');
6     readln(start_x);
7     write('Please Enter step_x:');
8     readln(step_x);
9     for i:=1 to 20 do
10    begin
11        x := start_x + ( i * step_x );
12        y := sin(x);
13        writeln('sin(', x:8:3, ') =', y:8:3);
14    end;
15    readln
16 end.
17
```

実行画面が現れる

input

```
Copyright (c) 1993-2017 by Florian Klaempfl and others
Target OS: Linux for x86-64
Compiling main.pas
Linking a.out
/usr/bin/ld.bfd: warning: link.res contains output sections; did you
16 lines compiled, 0.1 sec
Please Enter start_x: █
```

実行(3/4)



```
main.pas
1 program sum;
2 var start_x, step_x, x, y:real;
3 var i:integer;
4 begin
5   write('Please Enter start_x:');
6   readln(start_x);
7   write('Please Enter step_x:');
8   readln(step_x);
9   for i:=1 to 20
10  begin
11    x := start_x;
12    y := sin(x);
13    writeln('sin', x, ' = ', y);
14  end;
15  readln;
16 end.
17
```

数値を入れる
(プログラムに数値
データを与える)

```
Copyright (c) 1993-2017 by Florian Klaempfl and others
Target OS: Linux for x86-64
Compiling main.pas
Linking a.out
/usr/bin/ld.bfd: warning: link.res contains output sections; did
16 lines compiled, 0.1 sec
Please Enter start_x: 0.4
```

実行(4/4)



```
main.pas
1 program sum;
2 var start_x, step_x, x, y:real;
3 var i:integer;
4 begin
5   write('Please Enter start_x:');
6   readln(start_x);
7   write('Please Enter step_x:');
8   readln(step_x);
9   for i:=1 to 20
10  begin
11    x := start_x + i * step_x;
12    y := sin(x);
13    writeln('sin( ', x, ') = ', y);
14  end;
15  readln;
16 end.
17
```

さらに数値を入れると、
計算結果が表示される

```
Copyright (c) 1993-2017 by Florian Klaempfl and others
Target OS: Linux for x86-64
Compiling main.pas
Linking a.out
/usr/bin/ld.bfd: warning: link.res contains output sections; did you
16 lines compiled, 0.1 sec
Please Enter start_x:0.4
Please Enter step_x:0.1
sin( 0.500) = 0.479
sin( 0.600) = 0.565
sin( 0.700) = 0.644
sin( 0.800) = 0.717
sin( 0.900) = 0.783
sin( 1.000) = 0.841
sin( 1.100) = 0.891
sin( 1.200) = 0.932
sin( 1.300) = 0.964
sin( 1.400) = 0.985
sin( 1.500) = 0.997
sin( 1.600) = 1.000
sin( 1.700) = 0.992
sin( 1.800) = 0.974
sin( 1.900) = 0.946
sin( 2.000) = 0.909
sin( 2.100) = 0.863
sin( 2.200) = 0.808
sin( 2.300) = 0.746
sin( 2.400) = 0.675
```

実行の終了



The screenshot shows a Pascal IDE interface. The toolbar at the top includes buttons for Run, Debug, Stop, Share, Save, and Beautify. The 'Stop' button is highlighted with a blue box. A blue callout box with the text 「Stop」をクリック is positioned over the Stop button. Below the code editor, the 'input' window shows the following error message:

```
Compilation failed due to following error(s).  
  
Copyright (c) 1993-2017 by Florian Klaempfl and others  
Target OS: Linux for x86-64  
Compiling main.pas  
main.pas(12,14) Error: Identifier not found "son"  
main.pas(17) Fatal: There were 1 errors compiling module, stopping  
Fatal: Compilation aborted  
Error: /usr/bin/ppcx64 returned an error exitcode
```


演習 1



例題 1 のプログラムを実行して, $\sin(0.4)$ の値を確認しなさい

そのために `start_x`, `step_x` の値を適切に与えること

```
sin( 0.400) = 0.389
```

演習 2



例題 1 のプログラムの「sin」の部分を、わざと間違えて（「son」のように）、コンピュータによるプログラムの構文チェックの機能が有効に働いていることを確認しなさい

```
main.pas
1 program sum;
2 var start_x, step_x, x, y:real;
3 var i:integer;
4 begin
5   write('Please Enter start_x:');
6   readln(start_x);
7   write('Please Enter step_x:');
8   readln(step_x);
9   for i:=1 to 20 do
10  begin
11    x := start_x + ( i * step_x );
12    y := son(x);
13    writeln('sin(', x:8:3, ') =', y:8:3);
14  end;
15  readln
16 end.
17
```

input

Compilation failed due to following error(s).

```
Copyright (c) 1993-2017 by Florian Klaempfl and others
Target OS: Linux for x86-64
Compiling main.pas
main.pas(12,14) Error: Identifier not found "son"
main.pas(17) Fatal: There were 1 errors compiling module, stopping
Fatal: Compilation aborted
Error: /usr/bin/ppcx64 returned an error exitcode
```

演習 3



例題 1 のプログラムを **cos の値を計算**できるように書き換えて, 実行をなさい. そして, $\cos(0.4)$ の値を確認しなさい.

$y := \cos(x);$

```
cos ( 0.400 ) = 0.921
```