

Министерство науки и высшего образования Российской Федерации
Федеральное государственное автономное образовательное
учреждение высшего образования
«СЕВЕРО-КАВКАЗСКИЙ ФЕДЕРАЛЬНЫЙ
УНИВЕРСИТЕТ»

«Исследование основных возможностей Git и GitHub»

ОТЧЕТ

по лабораторной работе

Лабораторная работа 2.2 Условные операторы и циклы в языке Python

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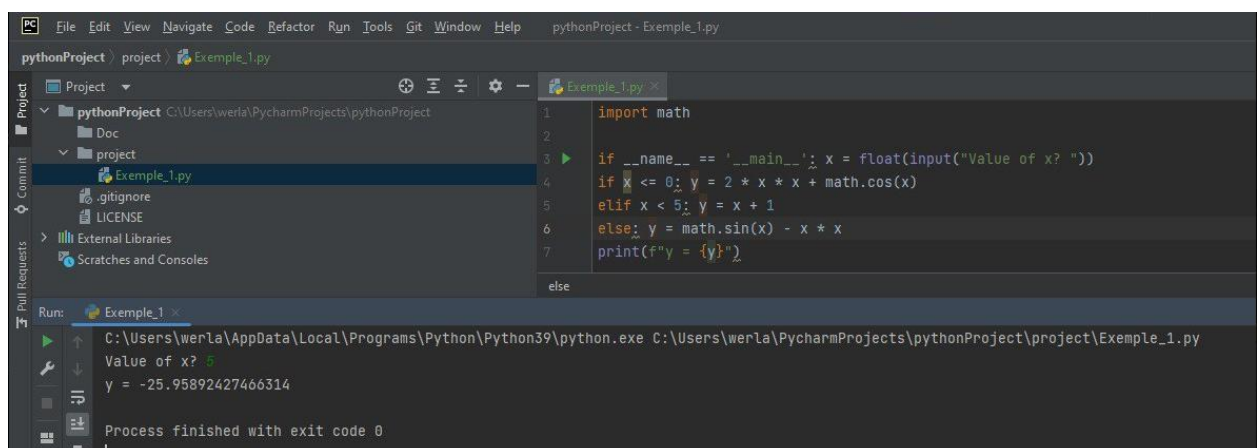
Ставрополь, 2022 г.

Лабораторная работа 2.2 Условные операторы и циклы в языке Python

Цель работы: приобретение навыков программирования разветвляющихся алгоритмов и алгоритмов циклической структуры. Освоить операторы языка Python версии 3.x if , while , for , break и continue , позволяющих реализовывать разветвляющиеся алгоритмы и алгоритмы циклической структуры.

7. Проработайте примеры лабораторной работы. Создайте для каждого примера отдельный модуль языка Python. Зафиксируйте изменения в репозитории.

1 ПРИМЕР

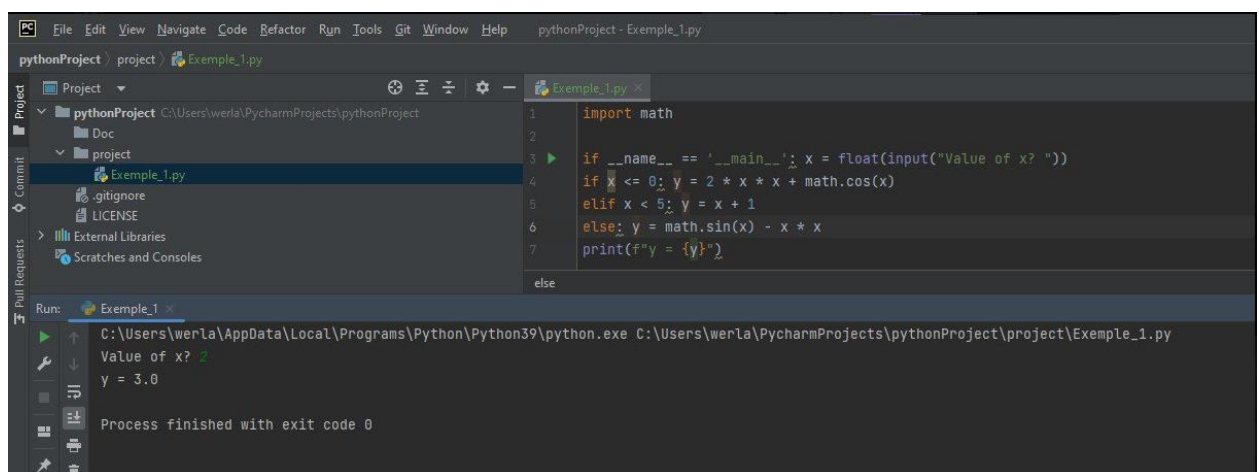


The screenshot shows the PyCharm IDE interface. The left sidebar displays the project structure with 'pythonProject' and 'project' folders. The 'project' folder contains 'Example_1.py'. The main editor window shows the code for 'Example_1.py':

```
1 import math
2
3 if __name__ == '__main__': x = float(input("Value of x? "))
4 if x <= 0: y = 2 * x * x + math.cos(x)
5 elif x < 5: y = x + 1
6 else: y = math.sin(x) - x * x
7 print(f"y = {y}")
```

The bottom panel shows the 'Run' output for 'Example_1':

```
C:\Users\werla\AppData\Local\Programs\Python\Python39\python.exe C:\Users\werla\PycharmProjects\pythonProject\project\Exemple_1.py
Value of x? 5
y = -25.95892427466314
Process finished with exit code 0
```



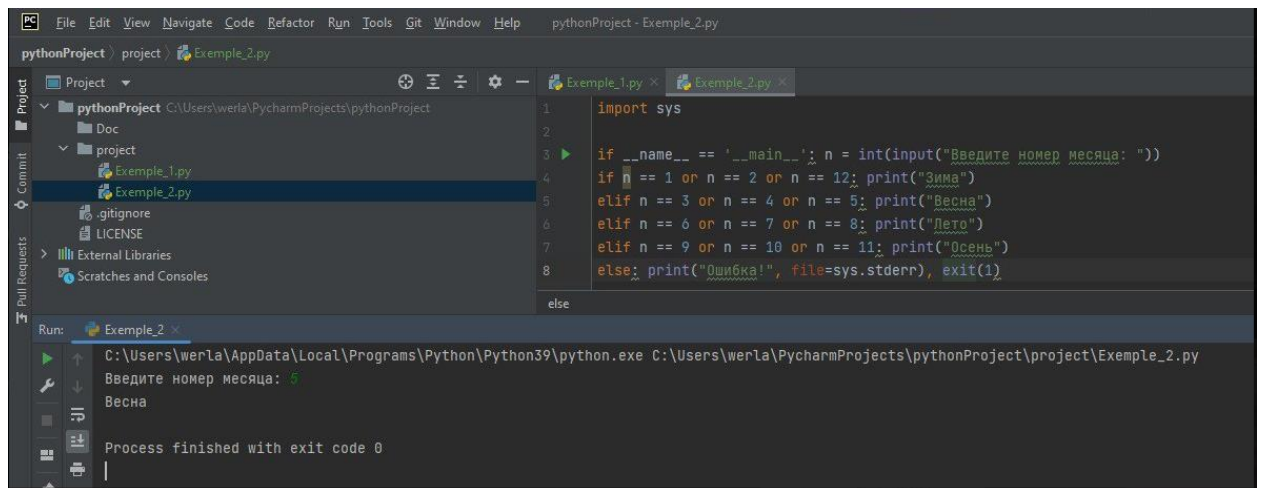
The screenshot shows the PyCharm IDE interface. The left sidebar displays the project structure with 'pythonProject' and 'project' folders. The 'project' folder contains 'Example_1.py'. The main editor window shows the code for 'Example_1.py':

```
1 import math
2
3 if __name__ == '__main__': x = float(input("Value of x? "))
4 if x <= 0: y = 2 * x * x + math.cos(x)
5 elif x < 5: y = x + 1
6 else: y = math.sin(x) - x * x
7 print(f"y = {y}")
```

The bottom panel shows the 'Run' output for 'Example_1':

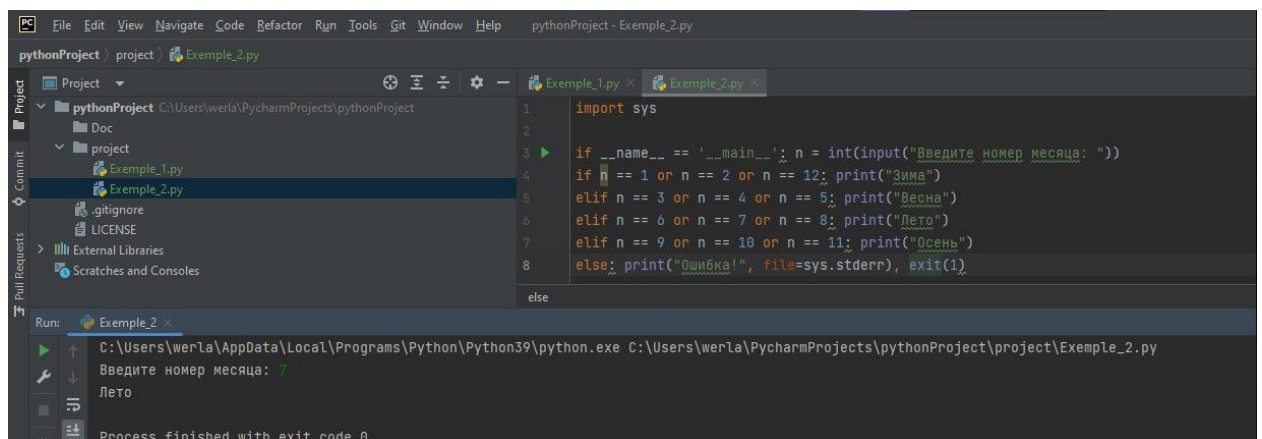
```
C:\Users\werla\AppData\Local\Programs\Python\Python39\python.exe C:\Users\werla\PycharmProjects\pythonProject\project\Exemple_1.py
Value of x? 2
y = 3.0
Process finished with exit code 0
```

2 ПРИМЕР



```
pythonProject - Example_2.py
pythonProject > project > Example_2.py
Project
  pythonProject C:\Users\werla\PycharmProjects\pythonProject
  Doc
  project
    Example_1.py
    Example_2.py
  .gitignore
  LICENSE
  External Libraries
  Scratches and Consoles
Run: Example_2
C:\Users\werla\AppData\Local\Programs\Python\Python39\python.exe C:\Users\werla\PycharmProjects\pythonProject\project\Example_2.py
Введите номер месяца: 5
Весна
Process finished with exit code 0
```

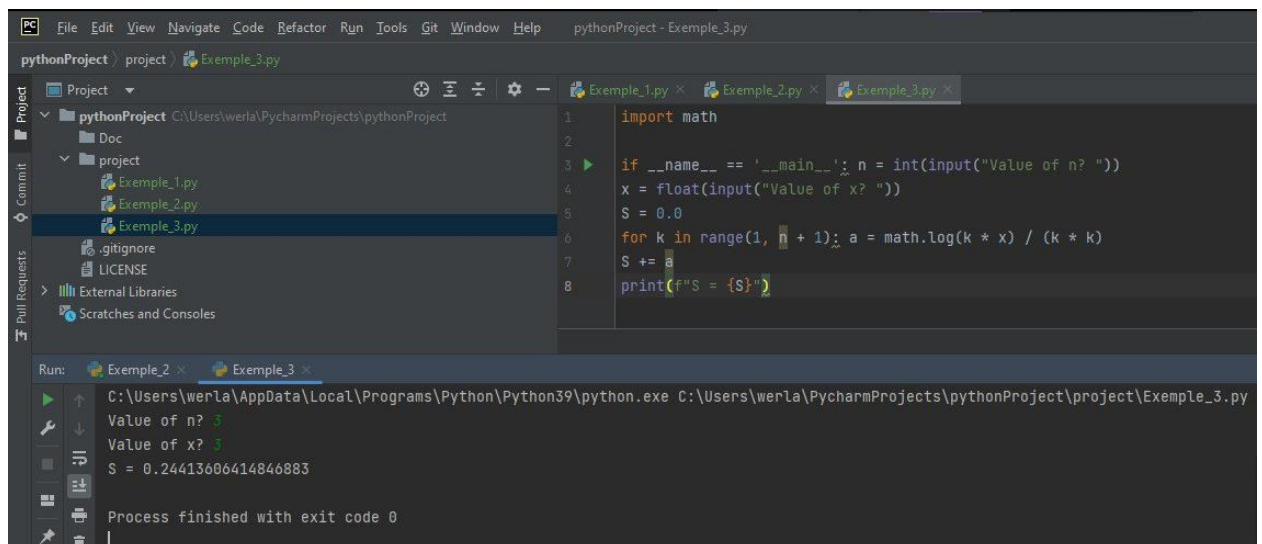
```
1 import sys
2
3 if __name__ == '__main__': n = int(input("Введите номер месяца: "))
4 if n == 1 or n == 2 or n == 12: print("Зима")
5 elif n == 3 or n == 4 or n == 5: print("Весна")
6 elif n == 6 or n == 7 or n == 8: print("Лето")
7 elif n == 9 or n == 10 or n == 11: print("Осень")
8 else: print("Ошибка!", file=sys.stderr), exit(1)
```



```
pythonProject - Example_2.py
pythonProject > project > Example_2.py
Project
  pythonProject C:\Users\werla\PycharmProjects\pythonProject
  Doc
  project
    Example_1.py
    Example_2.py
  .gitignore
  LICENSE
  External Libraries
  Scratches and Consoles
Run: Example_2
C:\Users\werla\AppData\Local\Programs\Python\Python39\python.exe C:\Users\werla\PycharmProjects\pythonProject\project\Example_2.py
Введите номер месяца: 7
Лето
Process finished with exit code 0
```

```
1 import sys
2
3 if __name__ == '__main__': n = int(input("Введите номер месяца: "))
4 if n == 1 or n == 2 or n == 12: print("Зима")
5 elif n == 3 or n == 4 or n == 5: print("Весна")
6 elif n == 6 or n == 7 or n == 8: print("Лето")
7 elif n == 9 or n == 10 or n == 11: print("Осень")
8 else: print("Ошибка!", file=sys.stderr), exit(1)
```

3 ПРИМЕР



```
pythonProject - Example_3.py
pythonProject > project > Example_3.py
Project
  pythonProject C:\Users\werla\PycharmProjects\pythonProject
  Doc
  project
    Example_1.py
    Example_2.py
    Example_3.py
  .gitignore
  LICENSE
  External Libraries
  Scratches and Consoles
Run: Example_2 Example_3
C:\Users\werla\AppData\Local\Programs\Python\Python39\python.exe C:\Users\werla\PycharmProjects\pythonProject\project\Example_3.py
Value of n? 3
Value of x? 3
S = 0.24413606414846883
Process finished with exit code 0
```

```
1 import math
2
3 if __name__ == '__main__': n = int(input("Value of n? "))
4 x = float(input("Value of x? "))
5 S = 0.0
6 for k in range(1, n + 1): a = math.log(k * x) / (k * k)
7 S += a
8 print(f"S = {S}")
```

The screenshot shows the PyCharm IDE with a project named 'pythonProject'. The file explorer on the left shows a 'project' folder containing 'Example_1.py', 'Example_2.py', and 'Example_3.py'. The main editor displays 'Example_3.py' with the following code:

```
1 import math
2
3 if __name__ == '__main__': n = int(input("Value of n? "))
4 x = float(input("Value of x? "))
5 S = 0.0
6 for k in range(1, n + 1): a = math.log(k * x) / (k * k)
7 S += a
8 print(f"S = {S}")
```

The Run window at the bottom shows the execution of 'Example_3.py' with the following output:

```
Value of n? 7
Value of x? 8
S = 0.08215003450479898
Process finished with exit code 0
```

4 ПРИМЕР

The screenshot shows the PyCharm IDE with a project named 'pythonProject'. The file explorer on the left shows a 'project' folder containing 'Example_1.py', 'Example_2.py', 'Example_3.py', and 'Example_4.py'. The main editor displays 'Example_4.py' with the following code:

```
1 import math
2 import sys
3
4 if __name__ == '__main__': a = float(input("Value of a? "))
5 if a < 0: print("Illegal value of a", file=sys.stderr), exit(1)
6 x, eps = 1, 1e-10
7 while True:
8     xp = x
9     x = (x + a / x) / 2
10    if math.fabs(x - xp) < eps:
11        break
12    print(f"x = {x}\nX = {math.sqrt(a)}")
```

The Run window at the bottom shows the execution of 'Example_4.py' with the following output:

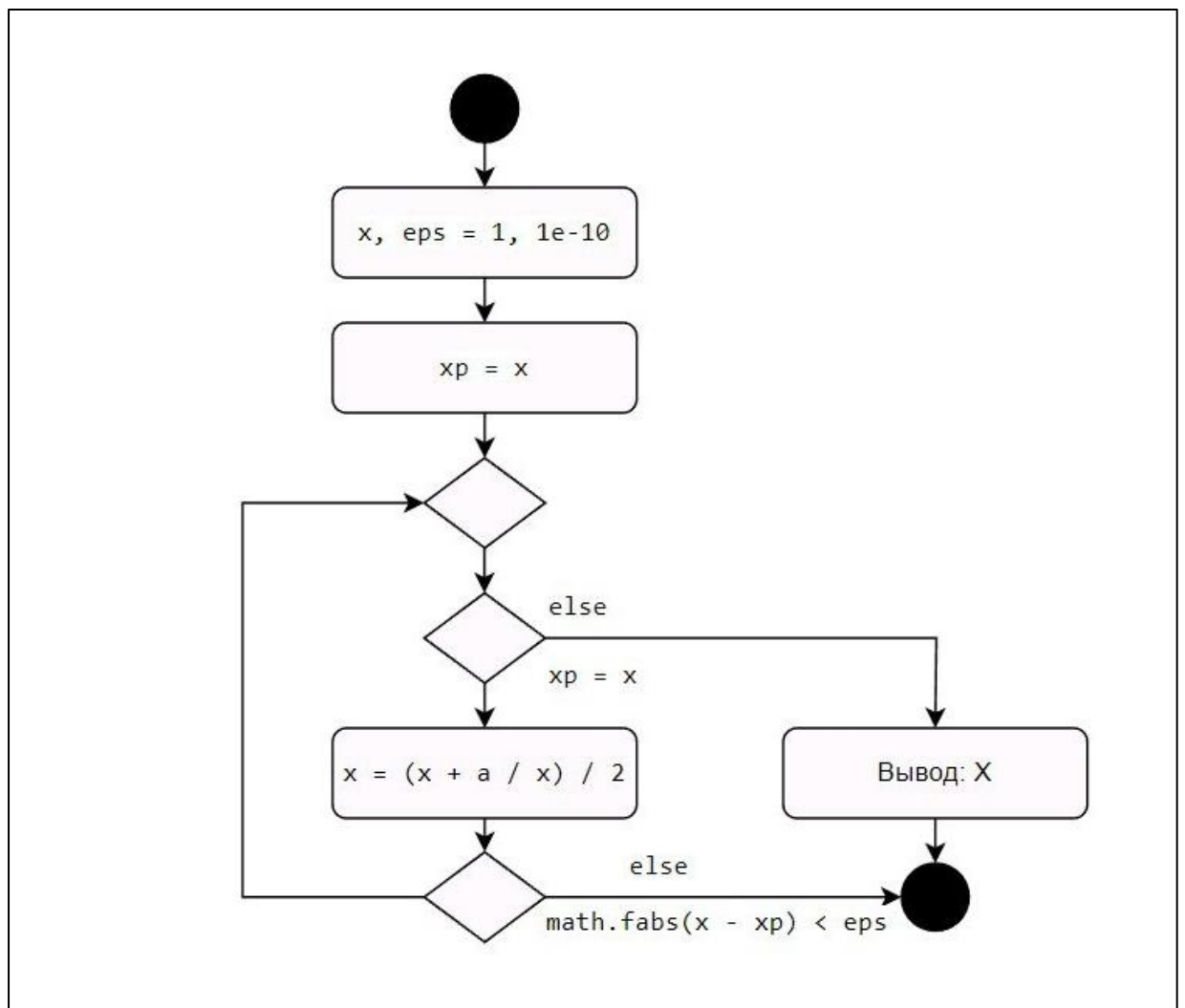
```
Value of a? 7
x = 2.6457513110645907
X = 2.6457513110645907
Process finished with exit code 0
```

The screenshot shows the PyCharm IDE with a project named 'pythonProject'. The file explorer on the left shows a 'project' folder containing 'Example_1.py', 'Example_2.py', 'Example_3.py', and 'Example_4.py'. The main editor displays 'Example_4.py' with the following code:

```
1 import math
2 import sys
3
4 if __name__ == '__main__': a = float(input("Value of a? "))
5 if a < 0: print("Illegal value of a", file=sys.stderr), exit(1)
6 x, eps = 1, 1e-10
7 while True:
8     xp = x
9     x = (x + a / x) / 2
10    if math.fabs(x - xp) < eps:
11        break
12    print(f"x = {x}\nX = {math.sqrt(a)}")
```

The Run window at the bottom shows the execution of 'Example_4.py' with the following output:

```
Value of a? 10
x = 3.162277660168379
X = 3.1622776601683795
Process finished with exit code 0
```



5 ПРИМЕР

pythonProject - Example_5.py

pythonProject > project > Example_5.py

```
1 import math
2 import sys
3 # Постоянная Эйлера.
4 EULER = 0.5772156649015328606
5 # Точность вычислений.
6 EPS = 1e-10
7
8 if __name__ == '__main__':
9     x = float(input("Value of x? "))
10    if x == 0:
11        print("Illegal value of x", file=sys.stderr)
12        exit(1)
13    a = x
14    S, k = a, 1
15    # Найти сумму членов ряда.
16    while math.fabs(a) > EPS:
17        a *= x * k / (k + 1) ** 2
18        S += a
19        k += 1
20    # Вывести значение функции.
21    print(f"Ei({x}) = {EULER + math.log(math.fabs(x)) + S}")
22
23 if __name__ == '__main__':
```

Run: Example_2 x Example_5 x

C:\Users\werla\AppData\Local\Programs\Python\Python39\python.exe C:\Users\werla\PycharmProjects\pythonProject\project\Exemple_5.py

Value of x? 10

Ei(10.0) = 2492.228976241855

Process finished with exit code 0

pythonProject - Example_5.py

pythonProject > project > Example_5.py

```
1 import math
2 import sys
3 # Постоянная Эйлера.
4 EULER = 0.5772156649015328606
5 # Точность вычислений.
6 EPS = 1e-10
7
8 if __name__ == '__main__':
9     x = float(input("Value of x? "))
10    if x == 0:
11        print("Illegal value of x", file=sys.stderr)
12        exit(1)
13    a = x
14    S, k = a, 1
15    # Найти сумму членов ряда.
16    while math.fabs(a) > EPS:
17        a *= x * k / (k + 1) ** 2
18        S += a
19        k += 1
20    # Вывести значение функции.
21    print(f"Ei({x}) = {EULER + math.log(math.fabs(x)) + S}")
22
23 if __name__ == '__main__':
```

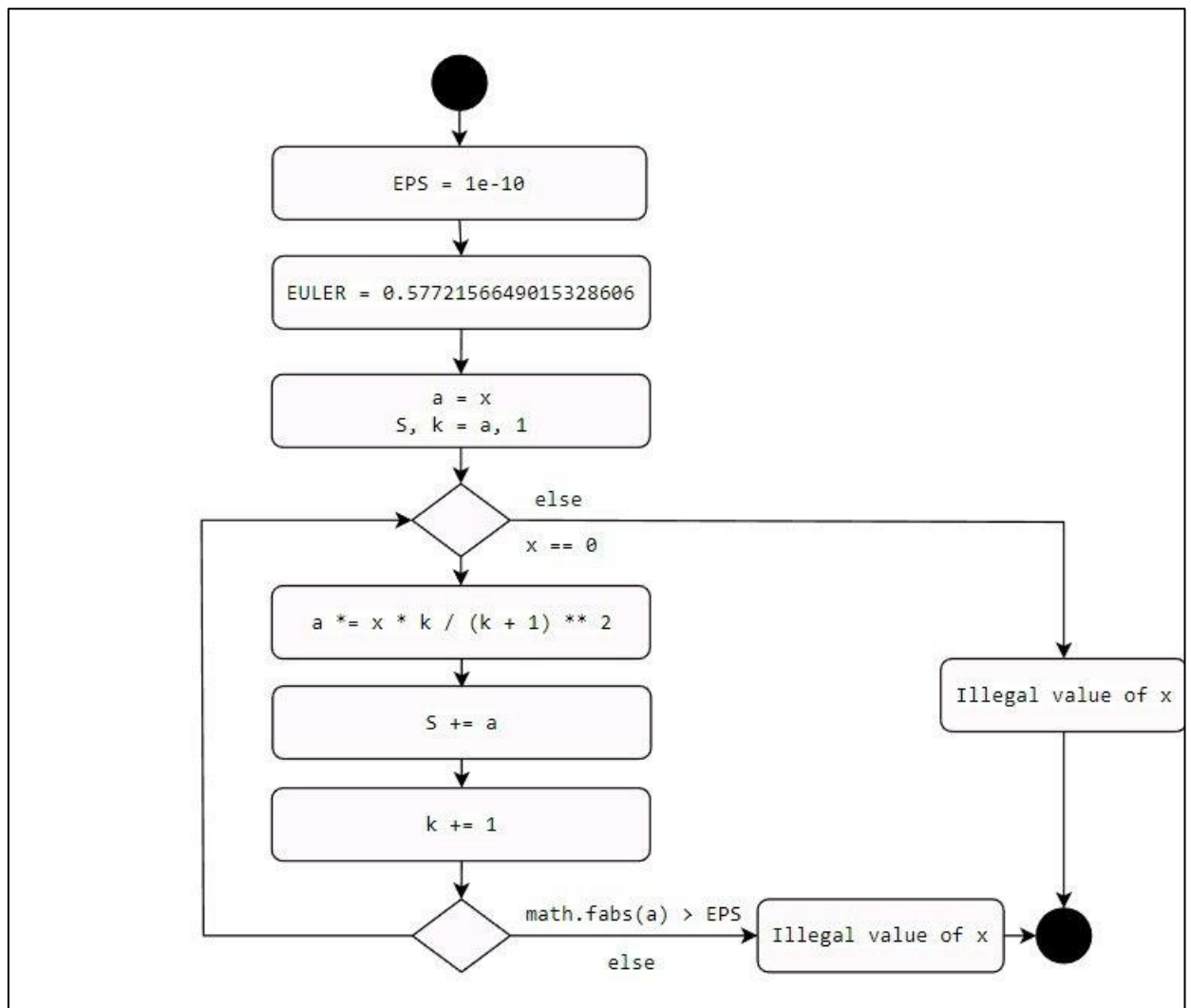
Run: Example_2 x Example_5 x

C:\Users\werla\AppData\Local\Programs\Python\Python39\python.exe C:\Users\werla\PycharmProjects\pythonProject\project\Exemple_5.py

Value of x? 20

Ei(20.0) = 25615652.66405659

Process finished with exit code 0



ЗАДАНИЕ 1

3. Дано число ($1 \leq m \leq 7$). Вывести на экран название дня недели, который соответствует этому номеру.

```

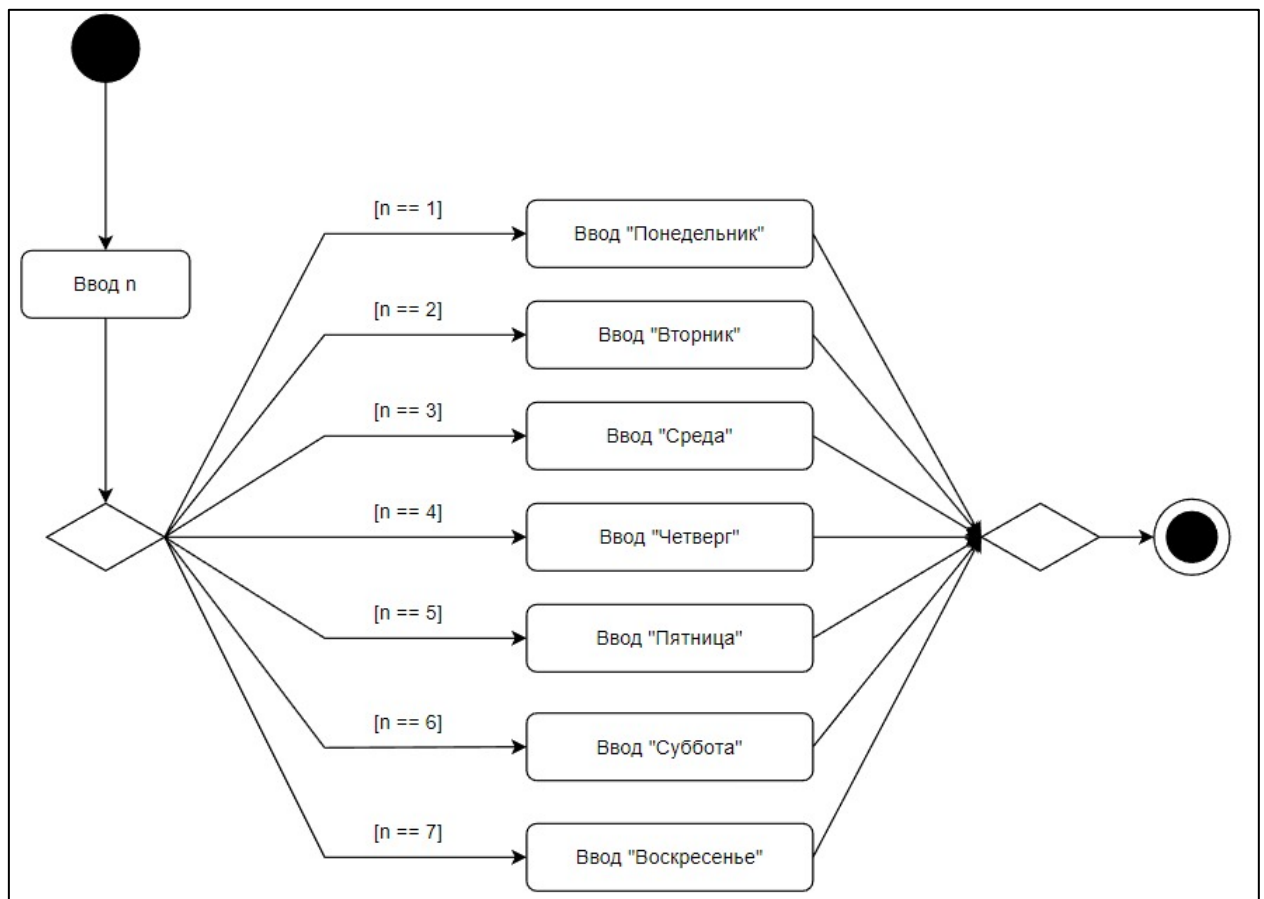
1 import math
2 import sys
3
4 if __name__ == '__main__': n = float(input("Введите день недели: "))
5 if n < 0 and n > 7: print("Illegal value of a", file=sys.stderr), exit(1)
6 if n == 1: print("Понедельник")
7 elif n == 2: print("Вторник")
8 elif n == 3: print("Среда")
9 elif n == 4: print("Четверг")
10 elif n == 5: print("Пятница")
11 elif n == 6: print("Суббота")
12 elif n == 7: print("Воскресенье")
13 else: print("Ошибка!", file=sys.stderr), exit(1)
  
```

The screenshot shows a Python IDE with the project "pythonProject" and file "indiv1_1.py". The code implements the task by taking a number `n` as input and printing the corresponding day of the week. The days are: 1 - Понедельник, 2 - Вторник, 3 - Среда, 4 - Четверг, 5 - Пятница, 6 - Суббота, 7 - Воскресенье. The code also includes error handling for values outside the range 1 to 7. The output shows the input "4" and the output "Четверг".

The screenshot shows the PyCharm IDE with a project named 'pythonProject'. The file explorer on the left shows a 'project' folder containing several Python files: 'Exemple_1.py', 'Exemple_2.py', 'Exemple_3.py', 'Exemple_4.py', 'Exemple_5.py', and 'individ_1.py'. The 'individ_1.py' file is open in the editor, showing the following code:

```
1 import math
2 import sys
3
4 if __name__ == '__main__': n = float(input("Введите день недели: "))
5 if n < 0 and n > 7: print("Illegal value of a", file=sys.stderr), exit(1)
6 if n == 1: print("Понедельник")
7 elif n == 2: print("Вторник")
8 elif n == 3: print("Среда")
9 elif n == 4: print("Четверг")
10 elif n == 5: print("Пятница")
11 elif n == 6: print("Суббота")
12 elif n == 7: print("Воскресенье")
13 else: print("Ошибка!", file=sys.stderr), exit(1)
```

The 'Run' console at the bottom shows the execution of 'individ_1.py'. The command prompt shows the input '5' and the output 'Пятница'. The process finished with exit code 0.



ЗАДАНИЕ 2

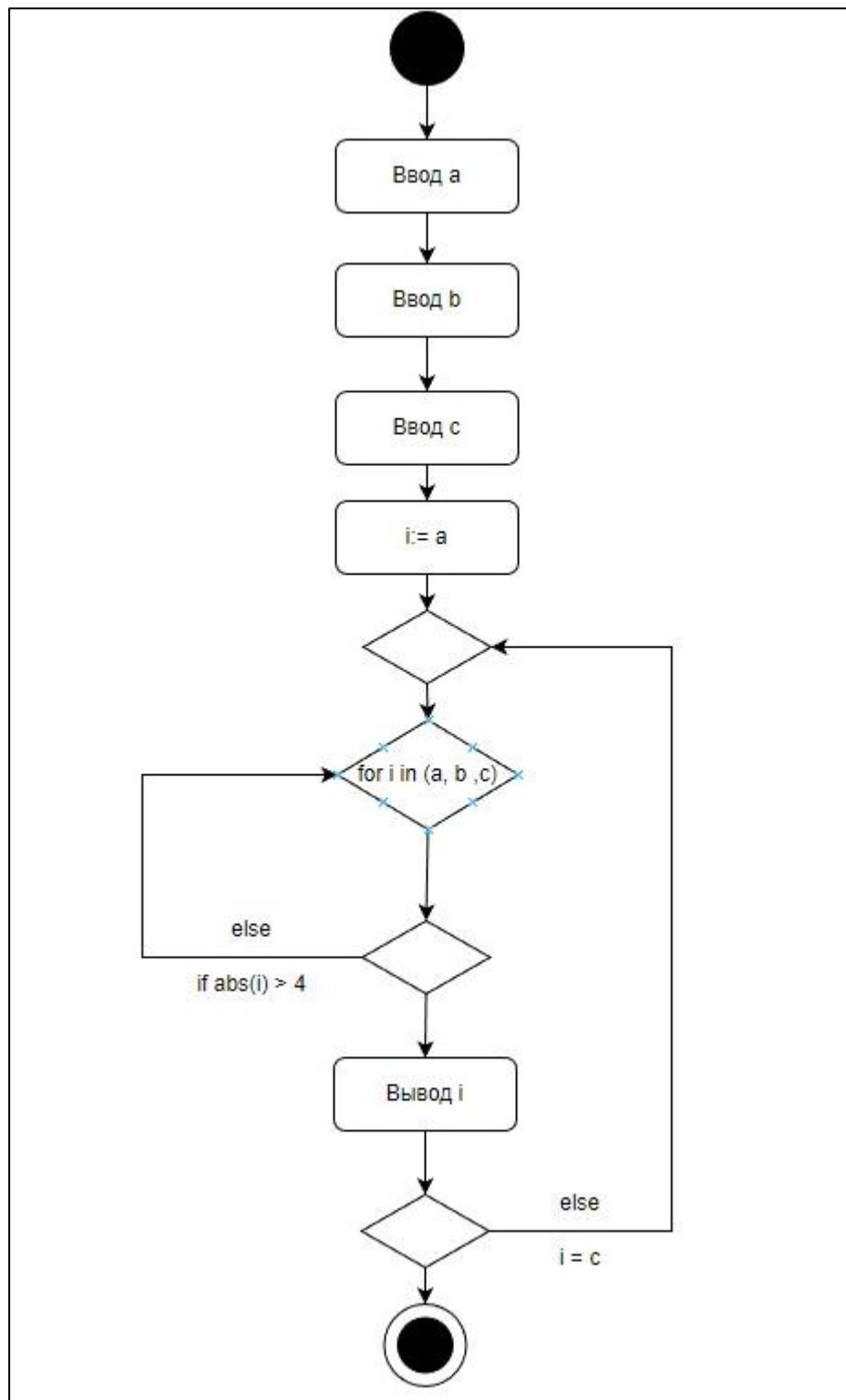
3. Из трех действительных чисел a , b и c выбрать те, модули которых не меньше 4.

The screenshot shows the PyCharm IDE interface. The top menu bar includes File, Edit, View, Navigate, Code, Refactor, Run, Tools, Git, Window, and Help. The title bar indicates the project is 'pythonProject - individ_2.py'. The left sidebar shows the project structure with 'pythonProject' containing 'Doc' and 'project' folders. The 'project' folder contains files 'Exemple_1.py' through 'Exemple_5.py', 'individ_1.py', and 'individ_2.py'. The 'Run' tab is active, showing the command: `C:\Users\werla\AppData\Local\Programs\Python\Python39\python.exe C:\Users\werla\PycharmProjects\pythonProject\project\individ_2.py`. The console output shows the program execution with inputs 2, 4, and 5, and outputs 4.0 and 5.0. The process finished with exit code 0.

```
1 import sys
2 import math
3
4 if __name__ == '__main__': a = float(input("Введите число a: "))
5 b = float(input("Введите число b: "))
6 c = float(input("Введите число c: "))
7 for i in (a,b,c):
8     if abs(i) >= 4:
9         print(i)
```

The screenshot shows the PyCharm IDE interface. The top menu bar includes File, Edit, View, Navigate, Code, Refactor, Run, Tools, Git, Window, and Help. The title bar indicates the project is 'pythonProject - individ_2.py'. The left sidebar shows the project structure with 'pythonProject' containing 'Doc' and 'project' folders. The 'project' folder contains files 'Exemple_1.py' through 'Exemple_5.py', 'individ_1.py', and 'individ_2.py'. The 'Run' tab is active, showing the command: `C:\Users\werla\AppData\Local\Programs\Python\Python39\python.exe C:\Users\werla\PycharmProjects\pythonProject\project\individ_2.py`. The console output shows the program execution with inputs 5, 6, and 1, and outputs 5.0 and 6.0. The process finished with exit code 0.

```
1 import sys
2 import math
3
4 if __name__ == '__main__': a = float(input("Введите число a: "))
5 b = float(input("Введите число b: "))
6 c = float(input("Введите число c: "))
7 for i in (a,b,c):
8     if abs(i) >= 4:
9         print(i)
```



ЗАДАНИЕ 3

Начав тренировки, спортсмен пробежал 10 км. Каждый следующий день он увеличивал дневную норму на 10% от нормы предыдущего дня. Какой суммарный путь пробежит спортсмен за 7 дней?

