

# Annuity & Perpetuity Calculator Project Using the Python Programming Language

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9/15/18

For the purposes of simultaneously brushing up on important and common financial formulas, while also becoming more adept in the Python programming language know.

## Objectives:

- Initiate a welcome “screen” that asks the user if they would like to begin/use the program or quit/exit
- Create a main “menu” where the user is asked whether they would like an annuity or perpetuity calculated
- Based on the user’s answer above, prompt the user for the appropriate inputs then calculate and display the annuity or perpetuity
- Prompt the user if they would like to go again or end the program.

Code for the welcome “screen”.

```
FinanceWelcome.py      MainMenu.py      Perpetuity.py      Annuity.py
1  from sys import exit
2  import math
3  import MainMenu
4
5  print("""
6      Welcome to the Annuity and Perpetuity calculator!
7      A project designed and created by Nate Boyle for the
8      sole purpose of learning and practicing coding in Python\n""")
9
10 def continueProgram():
11     choice = raw_input("\nPlease press y to continue or q to quit the program\n")
12     if choice == 'y':
13         MainMenu.mainMenu()
14     elif choice == 'q':
15         exit()
16     else:
17         print("\nThat wasn't an option. Please choose again.\n")
18
19 continueProgram()
```

## Code for the main “menu”.

```
FinanceWelcome.py | MainMenu.py | Perpetuity.py | Annuity.py
1 from sys import exit
2 import math
3 import Annuity
4 import Perpetuity
5
6
7
8 def mainMenu():
9     print("\nPlease pick an option for calculation.")
10    choice = raw_input("""
11    1) for an annuity with growth
12    2) for an annuity without growth
13    3) for a perpetuity with growth
14    4) for a perpetuity without growth
15    5) to exit the program\n""")
16
17    if choice == '1':
18        growth = True
19        Annuity.getValues(growth)
20    elif choice == '2':
21        growth = False
22        Annuity.getValues(growth)
23    elif choice == '3':
24        growth = True
25        Perpetuity.getValues(growth)
26    elif choice == '4':
27        growth = False
28        Perpetuity.getValues(growth)
29    elif choice == '5':
30        exit()
31    else:
32        print("\nThat wasn't an option. Please pick again.")
33        mainMenu()
```

Code and calculations for if the selected item is an annuity.

```
Annuity.py      FinanceWelcome.py      MainMenu.py
1  from sys import exit
2  import math
3  import MainMenu
4  import locale
5  locale.setlocale( locale.LC_ALL, 'en_US.utf-8' )
6
7  def nextMove(g):
8      print("\nWhat would you like to do next?")
9      choice = raw_input("""
10     a) to calculate another annuity
11     b) to return to the main menu
12     c) to exit the program\n""")
13     if choice == 'a':
14         if g == 0.0:
15             growth = False
16         else:
17             growth = True
18             getValues(growth)
19     elif choice == 'b':
20         MainMenu.mainMenu()
21     elif choice == 'c':
22         exit()
23     else:
24         print "\nThat wasn't an option. Please pick again."
25         nextMove(g)
26
27
28  def calculatePV(p, r, n, g):
29     presentValue = (p/(r-g)*(1-((1+g)/(1+r)**n))
30     presentValue = locale.currency(presentValue, grouping = True)
31     print "\n*** The PV (present value) of your annuity is : ", presentValue, " ***"
32     nextMove(g)
33
34  def getValues(g):
35     payment = float(input("\nPlease enter the first payment: "))
36     rate = float(input("\nPlease enter the interest rate (decimal): "))
37     if g == True:
38         growth = float(input("\nPlease enter the growth rate (decimal): "))
39     elif g == False:
40         growth = 0.0
41     periods = float(input("\nPlease enter the number of periods: "))
42
43     calculatePV(payment, rate, periods, growth)
```

Code and calculations for if the selected item is a perpetuity.

```
FinanceWelcome.py | MainMenu.py | Perpetuity.py
1 from sys import exit
2 import math
3 import MainMenu
4 import locale
5 locale.setlocale( locale.LC_ALL, 'en_US.utf-8' )
6
7 def nextMove(g):
8     print("\nWhat would you like to do next?")
9     choice = raw_input("""
10    a) to calculate another perpetuity
11    b) to return to the main menu
12    c) to exit the program\n""")
13     if choice == 'a':
14         if g == 0.0:
15             growth = False
16         else:
17             growth = True
18         getValues(growth)
19     elif choice == 'b':
20         MainMenu.mainMenu()
21     elif choice == 'c':
22         exit()
23     else:
24         print "\nThat wasn't an option. Please pick again."
25         nextMove(g)
26
27 def calculatePV(d, r, g):
28     presentValue = d/(r-g)
29     presentValue = locale.currency(presentValue, grouping = True)
30     print "\n*** The PV (present value) of your perpetuity is : ", presentValue, " ***"
31     nextMove(g)
32
33 def getValues(g):
34     dividend = float(input("\nPlease enter the dividend: "))
35     rate = float(input("\nPlease enter the interest rate (decimal): "))
36     if g == True:
37         growth = float(input("\nPlease enter the growth rate (decimal): "))
38     elif g == False:
39         growth = 0.0
40     calculatePV(dividend, rate, growth)
```

Here is a sample run with the code:

```
[Nates-MacBook-Air:FinanceProject ncboyle$ python FinanceWelcome.py
```

```
    Welcome to the Annuity and Perpetuity calculator!  
    A project designed and created by Nate Boyle for the  
    sole purpose of learning and practicing coding in Python
```

```
Please press y to continue or q to quit the program
```

```
y
```

```
Please pick an option for calculation.
```

- 1) for an annuity with growth
- 2) for an annuity without growth
- 3) for a perpetuity with growth
- 4) for a perpetuity without growth
- 5) to exit the program

```
1
```

```
Please enter the first payment: 1000
```

```
Please enter the interest rate (decimal): .12
```

```
Please enter the growth rate (decimal): .05
```

```
Please enter the number of periods: 24
```

```
*** The PV (present value) of your annuity is : $11,250.34 ***
```

```
What would you like to do next?
```

- a) to calculate another annuity
- b) to return to the main menu
- c) to exit the program

```
b
```

```
Please pick an option for calculation.
```

- 1) for an annuity with growth
- 2) for an annuity without growth
- 3) for a perpetuity with growth
- 4) for a perpetuity without growth
- 5) to exit the program

```
2
```

Please enter the first payment: 1000

Please enter the interest rate (decimal): .12

Please enter the number of periods: 24

\*\*\* The PV (present value) of your annuity is : \$7,784.32 \*\*\*

What would you like to do next?

- a) to calculate another annuity
- b) to return to the main menu
- c) to exit the program

b

Please pick an option for calculation.

- 1) for an annuity with growth
- 2) for an annuity without growth
- 3) for a perpetuity with growth
- 4) for a perpetuity without growth
- 5) to exit the program

1

Please enter the first payment: 1000

Please enter the interest rate (decimal): .12

Please enter the growth rate (decimal): 0.0

Please enter the number of periods: 24

\*\*\* The PV (present value) of your annuity is : \$7,784.32 \*\*\*

What would you like to do next?

- a) to calculate another annuity
- b) to return to the main menu
- c) to exit the program

b

Please pick an option for calculation.

- 1) for an annuity with growth
- 2) for an annuity without growth
- 3) for a perpetuity with growth
- 4) for a perpetuity without growth
- 5) to exit the program

3

Please enter the dividend: 25

Please enter the interest rate (decimal): .10

Please enter the growth rate (decimal): .025

\*\*\* The PV (present value) of your perpetuity is : \$333.33 \*\*\*

What would you like to do next?

- a) to calculate another perpetuity
- b) to return to the main menu
- c) to exit the program

b

Please pick an option for calculation.

- 1) for an annuity with growth
- 2) for an annuity without growth
- 3) for a perpetuity with growth
- 4) for a perpetuity without growth
- 5) to exit the program

4

Please enter the dividend: 25

Please enter the interest rate (decimal): .10

\*\*\* The PV (present value) of your perpetuity is : \$250.00 \*\*\*



What would you like to do next?

- a) to calculate another perpetuity
- b) to return to the main menu
- c) to exit the program

b

Please pick an option for calculation.

- 1) for an annuity with growth
- 2) for an annuity without growth
- 3) for a perpetuity with growth
- 4) for a perpetuity without growth
- 5) to exit the program

3

Please enter the dividend: 25

Please enter the interest rate (decimal): .10

Please enter the growth rate (decimal): 0.0

\*\*\* The PV (present value) of your perpetuity is : \$250.00 \*\*\*

What would you like to do next?

- a) to calculate another perpetuity
- b) to return to the main menu
- c) to exit the program

c

Nates-MacBook-Air:FinanceProject ncboyle\$ █