Malik Redwood

Business Finance

BFIN 2201

Seton Hall University

Homework 1

Retirement Planning

In [ ]:
```
# import the necessary libraries to complete the homework

# numpy provides the numerical computation for data structure, algorithms.
import numpy as np

# pandas provides tabular data structure with rows and columns.
import pandas as pd
```

1. According to the Seton Hall Career Center, finance majors from the Stillman School of Business earned an average salary of approximately $60,000 in their first year after graduation. Assume that this will be your salary after graduation. If you earn a 3% raise, what will be your salary the second year on the job? What will be your salary in the fifth year?

In [1]:
```
while True:
    # Starting salary of post graduate finance majors in their first year.
    # Present Value
    PV = int(input("What is your starting salary your first year post graduating finance? "))

    # rate of annual salary raise
    # Interest rate
    rate = float(input("What is the annual salary raise rate? (enter in decimal so (1% is 0.01, 3% is 0.03) "))

    # Input number of years on the job and returns the value as a integer or whole number.
    period_num = int(input("How many years on the job? "))

    # Outputs the expected salary after "n" years and adjusted for rate
    # FV = PV * (1 + r) ^ n
    FV = PV * ((1 + rate) ** (period_num - 1))

    # Prints the expected salary after "n" years on the job
    print("The recipient is expected to earn $" + str(round(FV, 2)) + " after " + str(period_num) + " years on the job.")

    # Ask user if they want to continue
    response = input("Do you want to continue? (Yes/No) ").lower()
    if response == "yes":
        print("Ok! Please continue")
    elif response == "no":
        print("Thank you for using the program!")
        break
    else:
        print("Invalid response. Please enter 'Yes' or 'No'.")
```

```
What is your starting salary your first year post graduating finance? 60000
What is the annual salary raise rate? (enter in decimal so (1% is 0.01, 3% is 0.03) 0.03
How many years on the job? 2
The recipient is expected to earn $61800.0 after 2 years on the job.
Do you want to continue? (Yes/No) Yes
Ok! Please continue
What is your starting salary your first year post graduating finance? 60000
What is the annual salary raise rate? (enter in decimal so (1% is 0.01, 3% is 0.03) 0.03
How many years on the job? 5
The recipient is expected to earn $67530.53 after 5 years on the job.
Do you want to continue? (Yes/No) No
Thank you for using the program!
```

2. Assume you start working when you are 20 years old and work through age 65 (i.e., you work until the day before you turn 66). What will be your 45th and final salary?

In [2]:
```
while True:
    # Input amount saved for.
    PV = int(input("What is your starting salary your first year post graduating finance? "))

    # rate of annual salary raise
    rate = float(input("What is the annual salary raise rate? (enter in decimal so (1% is 0.01, 3% is 0.03) "))

    # input your current age
    initial_age = int(input("How old are you when you started working? "))

    # input the age you wish to retire
    retiree_age = int(input("How old are you when you retire? "))

    # outputs the duration of your career by the difference between retiree_age and initial_age
    period_num = (retiree_age - initial_age)

    # Outputs the expected salary after "n" years and adjusted for rate
    # FV = PV * (1 + r) ^ (n - 1)
    FV = PV * ((1 + rate) ** (period_num - 1))

    # Prints the expected salary after "n" years on the job
    print("The recipient is expected to earn $" + str(round(FV, 2)) + " after " + str(period_num) + " years on the job.")

    # Ask user if they want to continue
    response = input("Do you want to continue? (Yes/No) ").lower()
    if response == "yes":
        print("Ok! Please continue")
    elif response == "no":
        print("Thank you for using the program!")
        break
    else:
        print("Invalid response. Please enter 'Yes' or 'No'.")
```

```
What is your starting salary your first year post graduating finance? 60000
What is the annual salary raise rate? (enter in decimal so (1% is 0.01, 3% is 0.03) 0.03
How old are you when you started working? 20
How old are you when you retire? 66
The recipient is expected to earn $226895.75 after 45 years on the job.
Do you want to continue? (Yes/No) No
Thank you for using the program!
```

3. According to financial planners, the average retiree requires approximately 70% of their last year's working salary each year to live comfortably in retirement. Assume that you want to earn a fixed amount of interest each year in retirement. Your goal is to spend only the interest and still live comfortably; thus, you will be able to spend the same amount of money each year forever. Assume you retire at age 66 and can earn a 6% return on your retirement savings. How much must you have saved to live only off the interest?

In [3]:
```
while True:
    # input your last year's working salary each year to live comfortably in retirement
    final_year_salary = float(input("what is your last year's working salary? "))

    # rate of return on your retirment saving
    interest_rate = float(input("What is the interest rate on your retirement saving?  (enter in decimal so (10% is 0.1, 3% is 0.03) "))

    # the percentage recommended by your financial planner
    percentage = float(input("According to your financial planner, what percentage of your last year's working salary is required to live comfortably in retirement?  (enter in decimal so (10% is 0.1, 2% is 0.03) "))

    # the amount the retiree needs to live a comfortable living based on the percentage recommended by their financial planner
    living_expense = percentage * final_year_salary

    # required amount of interest to live comfortably each year forever.
    interest_amount = living_expense / interest_rate

    # Prints how much you must save to live off only interest
    print("The recipient must have saved $" + str(round(interest_amount, 2)) + " to live off only interest.")

    # Ask user if they want to continue
    response = input("Do you want to continue? (Yes/No) ").lower()
    if response == "yes":
        print("Ok! Please continue")
    elif response == "no":
        print("Thank you for using the program!")
        break
    else:
        print("Invalid response. Please enter 'Yes' or 'No'.")
```

```
What is your last year's working salary? 226895.75
What is the interest rate on your retirement saving?  (enter in decimal so (10% is 0.1, 3% is 0.03) 0.06
According to your financial planner, what percentage of your last year's working salary is required to live comfortably in retirement?  (enter in decimal so (10% is 0.1, 3% is 0.03) 0.7
The recipient must have saved $2647117.08 to live off only interest.
Do you want to continue? (Yes/No) No
Thank you for using the program!
```

4. Suppose you live through age 90. How much money will you be able to bequeath (i.e. pass on in your will)?

In [1]:
```
while True:
    # Input the amount saved for retirement
    PV = float(input("What is your saved amount for retirement (input answer from Q3)? "))

    # Input the interest rate on your retirement savings account
    interest_rate = float(input("What is the interest rate on your retirement saving?  (enter in decimal so (10% is 0.1, 3% is 0.03) "))

    # input your current age
    retirement_age = int(input("What age did you retire? "))

    # input the age you passed away
    age_of_death = int(input("What age did you pass away? "))

    # output the duration of your career by the difference between initial_age and retiree_age
    period_retirement = age_of_death - retirement_age

    # Outputs the expected salary after "n" years and adjusted for rate
    # FV = PV * (1 + r) ^ (n - 1)
    bequeath_amount = PV * ((1 + interest_rate) ** (period_retirement))

    # Prints how will the retiree have bequeath at age 90
    print("The recipient at age 90 will have $" + str(round(bequeath_amount, 2)) + " to bequeath.")

    # Ask user if they want to continue
    response = input("Do you want to continue? (Yes/No) ").lower()
    if response == "yes":
        print("Ok! Please continue")
    elif response == "no":
        print("Thank you for using the program!")
        break
    else:
        print("Invalid response. Please enter 'Yes' or 'No'.")
```

```
What is your saved amount for retirement (input answer from Q3)? 2647117.08
What is the interest rate on your retirement saving?  (enter in decimal so (10% is 0.1, 3% is 0.03) 0.06
What age did you retire? 66
What age did you pass away? 90
The recipient at age 90 will have $10718004.04 to bequeath.
Do you want to continue? (Yes/No) No
Thank you for using the program!
```

5. Suppose instead, you plan to spend all your savings in retirement (i.e. the day before you turn 91, you expect to have run out of money).

a. How much will you have needed to save to live comfortably in retirement if you can earn a 6% return on your savings?

b. What about if you can only earn a 5% return on your savings?

In [1]:
```
# QUESTION 5.A and QUESTION 5.B

while True:
    # Input the amount saved for retirement
    PV = float(input("What is your saved amount for retirement (input answer from Q3)? "))

    # Input the interest rate on your retirement savings account
    interest_rate = float(input("What is the interest rate on your retirement saving?  (enter in decimal so (10% is 0.1, 3% is 0.03) "))

    # input your current age
    retirement_age = int(input("What age did you retire? "))

    # input the age you run out of money
    penniless_age = int(input("What age did you become penniless? "))

    # output the duration of your career by the difference between initial_age and retiree_age
    period_retirement = penniless_age - retirement_age

    # Outputs the expected salary after "n" years and adjusted for rate
    # FV = PV * (1 + r) ^ (n - 1)
    comfortable_savings = PV * ((1 + interest_rate) ** (period_retirement))

    # Prints how will the retiree have bequeath at age 90
    print("The recipient at age 90 will have $" + str(round(comfortable_savings, 2)) + " to bequeath.")

    # Ask user if they want to continue
    response = input("Do you want to continue? (Yes/No) ").lower()
    if response == "yes":
        print("Ok! Please continue")
    elif response == "no":
        print("Thank you for using the program!")
        break
    else:
        print("Invalid response. Please enter 'Yes' or 'No'.")
```

```
What is your saved amount for retirement (input answer from Q3)? 2647117.08
What is the interest rate on your retirement saving?  (enter in decimal so (10% is 0.1, 3% is 0.03) 0.06
What age did you retire? 66
What age did you become penniless? 90
The recipient at age 90 will have $10718004.04 to bequeath.
Do you want to continue? (Yes/No) Yes
Ok! Please continue
What is your saved amount for retirement (input answer from Q3)? 2647117.08
What is the interest rate on your retirement saving?  (enter in decimal so (10% is 0.1, 3% is 0.03) 0.05
What age did you retire? 66
What age did you become penniless? 90
The recipient at age 90 will have $8537217.15 to bequeath.
Do you want to continue? (Yes/No) No
Thank you for using the program!
```

6. Suppose instead of ensuring you have enough money to last through your lifetime, you decide to spend 200,000 dollars per year in retirement. How long until you run out of money?

In [ ]:
```
while True:
    # Input the amount saved for retirement
    PV = float(input("What is your saved amount for retirement (input answer from Q3)? "))

    # Input the interest rate on your retirement savings account
    interest_rate = float(input("What is the interest rate on your retirement saving?  (enter in decimal so (10% is 0.1, 3% is 0.03) "))

    # input your current age
    retirement_age = int(input("What age did you retire? "))

    # input the age you run out of money
    penniless_age = int(input("What age did you become penniless? "))

    # output the duration of your career by the difference between initial_age and retiree_age
    period_retirement = penniless_age - retirement_age

    # Outputs the expected salary after "n" years and adjusted for rate
    # FV = PV * (1 + r) ^ (n - 1)
    comfortable_savings = PV * ((1 + interest_rate) ** (period_retirement))

    # Prints how will the retiree have bequeath at age 90
    print("The recipient at age 90 will have $" + str(round(comfortable_savings, 2)) + " to bequeath.")

    # Ask user if they want to continue
    response = input("Do you want to continue? (Yes/No) ").lower()
    if response == "yes":
        print("Ok! Please continue")
    elif response == "no":
        print("Thank you for using the program!")
        break
    else:
        print("Invalid response. Please enter 'Yes' or 'No'.")
```

7. Assume you plan to leave nothing when you pass away, and you can earn a 6% return on your investment.

a. If you start saving for retirement at age 25, how much will you need to save each year to meet your savings goal?

b. If you start saving for retirement at age 35, how much will you need to save each year to meet your savings goal?

In [12]:
```
# QUESTION 7A and 7B
while True:

    # average salary of a first year post undergraduate finance major
    initial_salary = 60000

    # rate of annual raise and saving rate
    # Interest rate
    raise_rate = 0.03
    saving_rate = 0.06

    # Age prospect wishes to start retiring
    initial_num = int(input("what age do you wish to start saving for retirement? enter 25/35 "))

    # The number of years before retirement
    period_num = initial_num - 20

    # Salary at age 25
    # FV = PV / (1 + r) ^ n
    salary = initial_salary * ((1 + raise_rate) ** period_num)

    # Calculate the present value
    # PV = FV / (1 + r)^n
    PV = salary / ((1 + saving_rate) ** (66 - initial_num))
    print("If the prospect starts to save for retirement at age "+ str(initial_num) + " it will need to save $" + str(round(PV, 2)) + " each month")

    # Ask user if they want to continue
    response = input("Do you want to continue? (Yes/No) ").lower()
    if response == "yes":
        print("Ok! Please continue")
    elif response == "no":
        print("Thank you for using the program!")
        break
    else:
        print("Invalid response. Please enter 'Yes' or 'No'.")
```

```
What age do you wish to start saving for retirement? enter 25/35 25
If the prospect starts to save for retirement at age 25 it will need to save $6379.65 each month
Do you want to continue? (Yes/No) Yes
Ok! Please continue
What age do you wish to start saving for retirement? enter 25/35 35
If the prospect starts to save for retirement at age 35 it will need to save $15354.22 each month
Do you want to continue? (Yes/No) No
Thank you for using the program!
```

8. What did you learn from this assignment?

In this assignment, I learned to estimate my retirement savings. I believe finding a companies with a good saving raises for retirement can achieve a looser retirement budget. The rate is important because a few points up can grant someone hundreds if not thousands of dollars in savings. Outside the scope of the class, I was able to create an input and output function that uses the FV = PV * (1 + r) ** n.

In [ ]: