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Business Finance

BFIN 2201

Seton Hall University

Homework 2

Mortgage Analysis

In [1]:
```
# 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 Zillow, the median home price in New Jersey last year was approximately 450,000 dollars. To qualify for the best mortgage rates, you will need to make a 20.00% down payment. How much will you need to have saved to buy a 450,000 dollars house in New Jersey?

In [2]:
```
while True:
    # the median home price in New Jersey last year
    # enter the value 450000
    home_price = float(input("what is the median home price in New Jersey last year? "))

    # the down payment required to qualify for the best mortgage rate
    down_payment = float(input("What down payment percentage must you pay to get the best mortgage rate? (enter in decimal so (1% is 0.01, 3% is 0.03) "))

    # Outputs the expected salary after "n" years and adjusted for rate
    saved_amount = home_price * down_payment

    # Prints the expected salary after "n" years on the job
    print("The recipient needs to have saved $" + str(round(saved_amount, 2)) + " to buy a $" + str(home_price) + " house in New Jersey.")

    # 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 the median home price in New Jersey last year? 450000
What down payment percentage must you pay to get the best mortgage rate? (enter in decimal so (1% is 0.01, 3% is 0.03) 0.2
The recipient needs to have saved $90000.0 to buy a $450000.0 house in New Jersey.
Do you want to continue? (Yes/No) No
Thank you for using the program!
```

2. The current interest rate for a 30-year mortgage is 6.25%. Assuming you put 20% down, how much will you pay per month for a 30-year mortgage?

In [3]:
```
pip install numpy_financial
```

```
Requirement already satisfied: numpy_financial in c:\users\redwooma\anaconda3\lib\site-packages (1.0.0)
Requirement already satisfied: numpy>=1.15 in c:\users\redwooma\anaconda3\lib\site-packages (from numpy_financial) (1.21.5)
Note: you may need to restart the kernel to use updated packages.
```

In [4]:
```
import numpy_financial as npf

while True:

    # the present value is down payment deducted from the median home price in New Jersey last year
    # home_price - saved_amount
    present_value = float(input("What is the present value of the home loan after the down payment? "))

    # number of periods in the mortgage and output the number of months
    input_p = float(input("How many years is on the mortgage? "))
    periods = input_p * 12

    # the interest rate of the mortgage
    input_i = float(input("What is the current interest rate for a " + str(input_p) + "-year mortgage? (enter in decimal so (1% is 0.01, 3.3% is 0.033) "))
    interest_rate = input_i / 12

    # Payment per month for a 30-year mortgage
    payment = npf.pmt(interest_rate, periods, -present_value)

    # how much would you pay per month for a 30-year mortgage
    # Prints the expected salary after "n" years on the job
    print("The recipient needs to pay $" + str(round(payment, 2)) + " for a " + str(periods) + "-year mortgage 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 is the present value of the home loan after the down payment? 360000
How many years is on the mortgage? 30
What is the current interest rate for a 30.0-year mortgage? (enter in decimal so (1% is 0.01, 3.3% is 0.033) 0.0625
The recipient needs to pay $2216.58 for a 360.0-year mortgage each month.
Do you want to continue? (Yes/No) No
Thank you for using the program!
```

3. How much will you pay in interest over the life of the loan?

In [5]:
```
while True:
    # Input the number of months on the loan
    loan_periods = float(input("How many monthly payments will you make on a 30-year mortgage? "))

    # Input the monthly payment amount on the loan
    loan_payment = float(input("How much are you paying per month on a 30-year mortgage for a home that is 450000? "))

    # Input the current value of the loan
    loan_present_value = float(input("How much is the current home loan? "))

    # Calculate the total amount paid in interest
    total_payment = (loan_periods * loan_payment)

    # Calculate the total amount paid on the loan
    final_amount_paid = total_payment + loan_present_value
    print("The recipient needs to pay $" + str(round(final_amount_paid, 2)) + " interest over the life of the loah.")

    # 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'.")
```

```
How many monthly payments will you make on a 30-year mortgage? 360
How much are you paying per month on a 30-year mortgage for a home that is 450000? 2216.58
How much is the current home loan? 360000
The recipient needs to pay $115760.8 interest over the life of the loah.
Do you want to continue? (Yes/No) No
Thank you for using the program!
```

4. After 5 years, how much will you still owe on your mortgage?

In [1]:
```
import numpy_financial as npf

while True:
    # input the 5 years for the number of periods
    input_p = float(input("How many years in the future do you wish to look into? "))
    periods = input_p * 12

    # input the monthly payment amount
    payment = float(input("How much is the monthly payments on a 30-year mortgage? "))

    # input the rate on the mortgage
    input_i = float(input("What is the current interest rate for a " + str(input_p) + "-year mortgage? (enter in decimal so (1% is 0.01, 3.3% is 0.033) "))
    interest_rate = input_i / 12

    # input the present value on the mortgage
    present_value = float(input("How much is the current home loan? "))

    # Calculate the future value on the mortgage in five years
    future_value = npf.fv(interest_rate, periods, -payment, present_value)
    print("You will owe " + str(abs(round(future_value, 2))) + " after 5 years.")

    # 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'.")
```

```
How many years do you wish to start with? 5
How much is the monthly payments on a 30-year mortgage? 2216.58
What is the current interest rate for a 5.0-year mortgage? (enter in decimal so (1% is 0.01, 3.3% is 0.033) 0.0625
How much is the current home loan? 360000
You will owe 336014.2 after 5 years.
Do you want to continue? (Yes/No) No
Thank you for using the program!
```

5. After 5 years, suppose interest rates have dropped. You can now refinance your mortgage. When you refinance your mortgage, you pay off the original mortgage and take out a new mortgage. This new mortgage will likely have a different rate but will restart the term. Suppose you can refinance into a 15-year mortgage at 4.00%. What will be your new monthly payment?

In [1]:
```
import numpy_financial as npf

while True:

    # the present value is down payment deducted from the median home price in New Jersey last year
    # home_price - saved_amount
    present_value = float(input("What is the present value of the home loan after 5 years? "))

    # number of periods in the mortgage and output the number of months
    input_p = float(input("How many years is on the mortgage? "))
    periods = input_p * 12

    # the interest rate of the mortgage
    input_i = float(input("What is the current interest rate for a " + str(input_p) + "-year mortgage? (enter in decimal so (1% is 0.01, 3.3% is 0.033) "))
    interest_rate = input_i / 12

    # Payment per month for a 30-year mortgage
    payment = npf.pmt(interest_rate, periods, -present_value)

    # how much would you pay per month for a 30-year mortgage
    # Prints the expected salary after "n" years on the job
    print("The recipient needs to pay $" + str(round(payment, 2)) + " for a 15-year mortgage 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 is the present value of the home loan after 5 years? 336014.2
How many years is on the mortgage? 15
What is the current interest rate for a 15.0-year mortgage? (enter in decimal so (1% is 0.01, 3.3% is 0.033) 0.04
The recipient needs to pay $2485.46 for a 15-year mortgage each month.
Do you want to continue? (Yes/No) No
Thank you for using the program!
```

6. After 5 more years, how much will you owe on your mortgage?

In [2]:
```
import numpy_financial as npf

while True:
    # input the 5 years for the number of periods
    input_p = float(input("How many years in the future do you wish to look into? "))
    periods = input_p * 12

    # input the monthly payment amount
    payment = float(input("How much is the monthly payments on a 15-year mortgage? "))

    # input the rate on the mortgage
    input_i = float(input("What is the current interest rate for a " + str(input_p) + "-year mortgage? (enter in decimal so (1% is 0.01, 3.3% is 0.033) "))
    interest_rate = input_i / 12

    # input the present value on the mortgage
    present_value = float(input("How much is the current home loan after 5 years? "))

    # Calculate the future value on the mortgage in five years
    future_value = npf.fv(interest_rate, periods, -payment, present_value)
    print("You will owe " + str(abs(round(future_value, 2))) + " after 5 more years.")

    # 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'.")
```

```
How many years do you wish to start with? 5
How much is the monthly payments on a 15-year mortgage? 2485.46
What is the current interest rate for a 5.0-year mortgage? (enter in decimal so (1% is 0.01, 3.3% is 0.033) 0.04
How much is the current home loan after 5 years? 336014.2
You will owe 245488.74 after 5 more years.
Do you want to continue? (Yes/No) No
Thank you for using the program!
```

7. At this time, you decided you will pay an extra 250 dollar per month to pay down your mortgage even faster. How much quicker will you be able to pay off your mortgage?

In [3]:
```
import numpy_financial as npf

while True:

    # input the monthly payment amount
    input_p = float(input("How much is the monthly payments on a 15-year mortgage? "))
    input_a = float(input("How much do you want to add to the monthly payments on a 15-year mortgage? "))
    payment = input_p + input_a

    # input the rate on the mortgage
    input_i = float(input("What is the current interest rate for the 15-year mortgage? (enter in decimal so (1% is 0.01, 3.3% is 0.033) "))
    interest_rate = input_i / 12

    # input the present value on the mortgage
    present_value = float(input("How much is the current home loan after 5 more years? "))

    # input the future value on the mortgage
    future_value = float(input("What is the expected amount at the end of the loan? "))

    # calculate NPER using numpy_financial
    nper = npf.nper(interest_rate, payment, present_value, future_value)

    print('You will be able to pay off your mortgage in ' + str(abs(round(nper/12))) + ' years.')

    # 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'.")
```

```
How much is the monthly payments on a 15-year mortgage? 2485.46
How much do you want to add to the monthly payments on a 15-year mortgage? 250
What is the current interest rate for the 15-year mortgage? (enter in decimal so (1% is 0.01, 3.3% is 0.033) 0.04
How much is the current home loan after 5 more years? 336014.2
What is the expected amount at the end of the loan? 0
You will be able to pay off your mortgage in 9 years.
Do you want to continue? (Yes/No) No
Thank you for using the program!
```

8. What did you learn from this assignment?

In the assignment, I learned to calculate the present value and future value of a home mortgage. Outside the scope of the class, the assignment gave me insight into the strengths and weaknesses of a 15-year mortgage and a 30-year mortgage. While the 30-year mortgage offer a lower payment offer, you pay more in interest and you are give a longer period of time to pay off the loan. Unfortunately, you appear to pay more since you have a longer period of time. However, the 15-year mortgage offers a shorter duration, you pay less in interest, but have a higher monthly payment plan. Unfortunately, you appear to pay more in the short run which can increase your monthly expenses when trying to budget.

In [ ]:
```
```