

# Investment Strategy (10yrs)

December 30, 2024

## 0.1 Intro

```
[39]: #import
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
```

```
[40]: #lists
Year = []
Yearly_Income = []
Yearly_Expenses = []
Yearly_Investment = []
Annual_Returns = []
```

### 0.1.1 Assumptions

- Assume that your yearly income is fixed e.g. \$35000
- Assume that your yearly expense are the half of the income
- Assume that the average interest rate is 8% per year (compound)
- Invest half of the income

```
[41]: income = 80000
expense = income / 2

interest_rate = 0.08
investment = income / 2
annual_return = investment * interest_rate

year = 2025
```

```
[42]: Year.append(year)
Yearly_Income.append(income)
Yearly_Expenses.append(expense)
Yearly_Investment.append(investment)
Annual_Returns.append(annual_return)
```

### 0.1.2 n years of investment

```
[43]: invested_years = 20
      for i in range(0, invested_years-1):
          #update the investment compound + next investment
          investment = investment + annual_return + income/2

          #update the annual return
          annual_return = investment * interest_rate

          #append
          Year.append(year+ i + 1)
          Yearly_Income.append(income)
          Yearly_Expenses.append(expense)
          Yearly_Investment.append(investment)
          Annual_Returns.append(annual_return)
```

### 0.1.3 Build a Data Frame

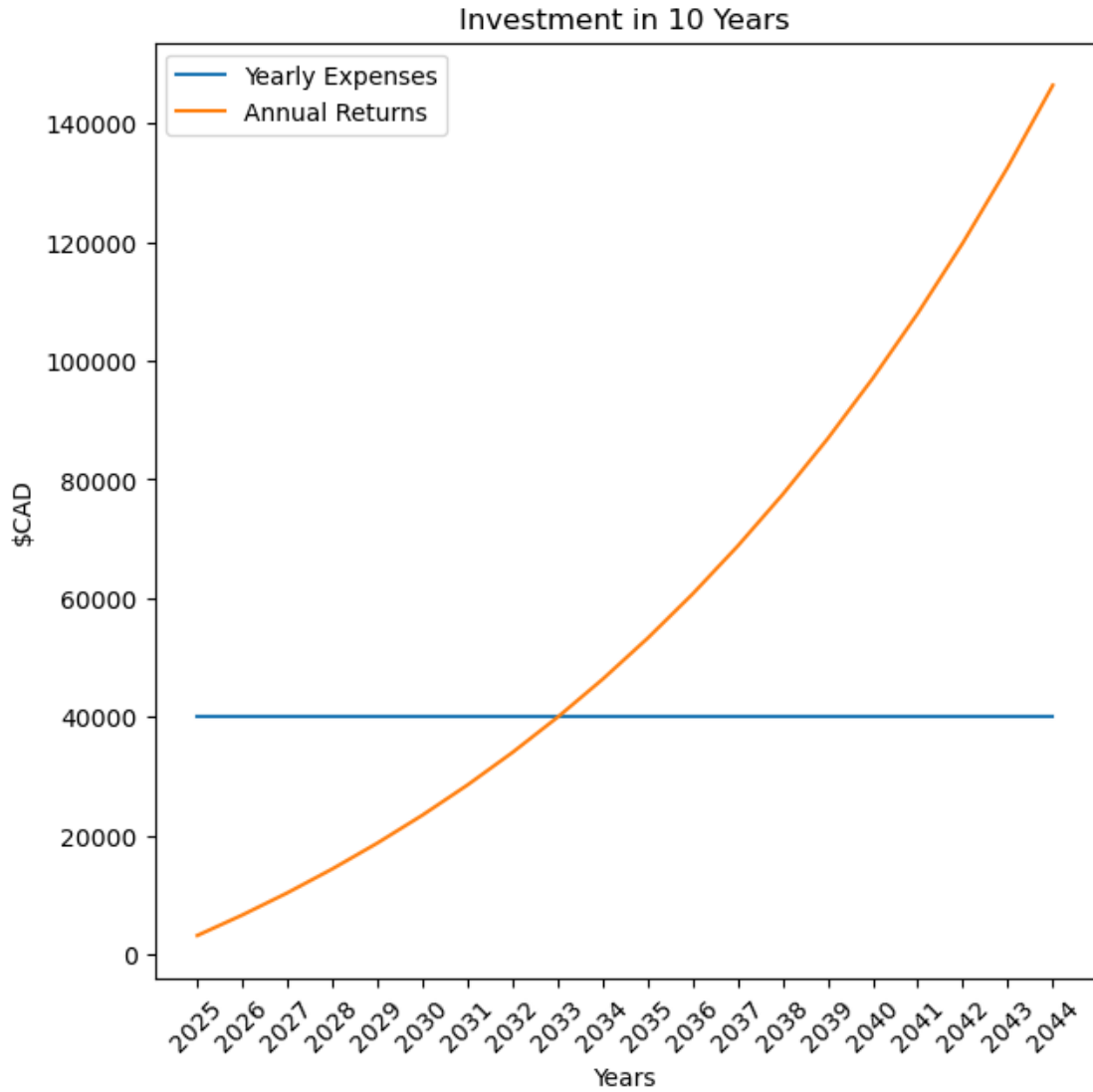
```
[44]: df = pd.DataFrame()
      df['Year'] = Year
      df['Yearly Income'] = Yearly_Income
      df['Yearly Expenses'] = Yearly_Expenses
      df['Yearly Investment'] = Yearly_Investment
      df['Annual Returns'] = Annual_Returns

      #df
```

### 0.1.4 Visualize

```
[45]: plt.figure(figsize = (7, 7))
      plt.plot(df['Year'], df['Yearly Expenses'], label = 'Yearly Expenses')
      plt.plot(df['Year'], df['Annual Returns'], label = 'Annual Returns')
      plt.title('Investment in 10 Years')
      plt.xlabel('Years')
      plt.ylabel('$CAD')
      plt.xticks(df['Year'])
      plt.xticks(rotation = 45)
      plt.legend()
```

```
[45]: <matplotlib.legend.Legend at 0x7f6f30680c50>
```



```
[46]: df[df['Yearly Expenses'] <= df['Annual Returns']].head(1)
```

```
[46]:   Year  Yearly Income  Yearly Expenses  Yearly Investment  Annual Returns
9  2034           80000           40000.0       579462.498636       46356.999891
```

### 0.1.5 Conclusion

After 2034, we can stay out with expenses since returns higher than the expenses. Note that this is very simple simulation. For the further analysis, we will need to consider the fluctuation of interest rate, expenses, investment etc.