Time is Money:
Personal Finance Applications
of the Time Value of Money

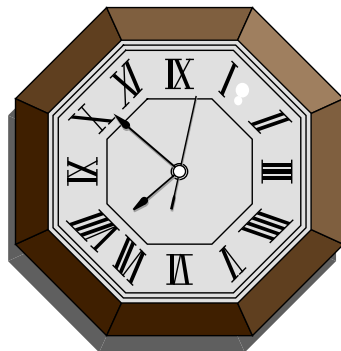## Barbara O'Neill, Ph.D., CFP®, AFC®

So What Exactly Is The Time Value of Money? (Review)

Key message of remainder of class:

Compound interest can be...

- Your worst enemy (credit card debt)
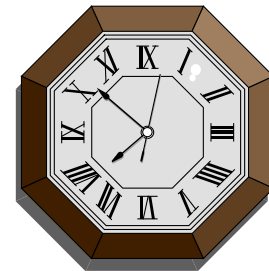- Your best friend (5+ decades of compound interest)

The choice is up to you!

Ways to Calculate TV of Money

- Mathematically

- Financial calculator (e.g. TI-BA35)

- Computer spreadsheets with formulas
  - (e.g., Microsoft Excel)

- TV of money interest factor tables

Key Variables in TV of Money Problems

- N-   Number of compounding periods
- % i- Interest rate (for compounding FV or discounting PV)
- PV
- FV
- For annuity calculations, periodic payment or receipt amount
  - Enter 3 known variables; solve for the 4th (unknown) variable

4

Let's Review

- Future value of a lump sum
  - **Example:** Value of $10,000 gift *today* in 20 years
  - 8% i, N =20, FVF =4.6610 ($46,610)
- Present value of a lump sum
  - **Example:** Value of a $10,000 gift *in 20 years* today
  - 8%i, N =20, PVF =.2145 ($2,145)

Problem #1

Your first "real" job pays $32,000 a year to start. How much will you need to be earning in 20 years to maintain the *same* purchasing power if inflation averages
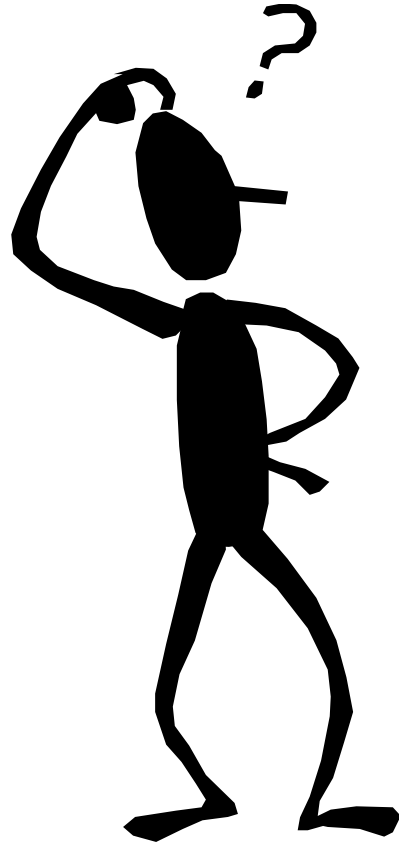
3% ?

4% ?

5% ?

Problem #2

- Your grandparents (age 60 and 62) are about to retire next month with a monthly income of $2,000. Assuming an annual inflation rate of 4%, how much will they need in 10 years to equal the purchasing power of $2,000 today?

  20 years?

  30 years?

What can your grandparents do to prevent inflation from eroding their purchasing power?

Problem #3

Your rich uncle has promised to give you $25,000. The only "catch" is that you must graduate from college and get a "real job" before he gives it to you. Let's assume that's in 4 years. What is the value of his gift today if his money is earning
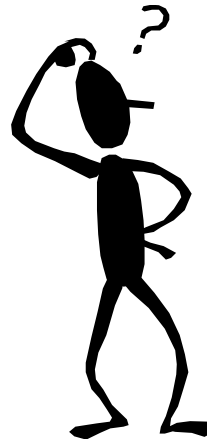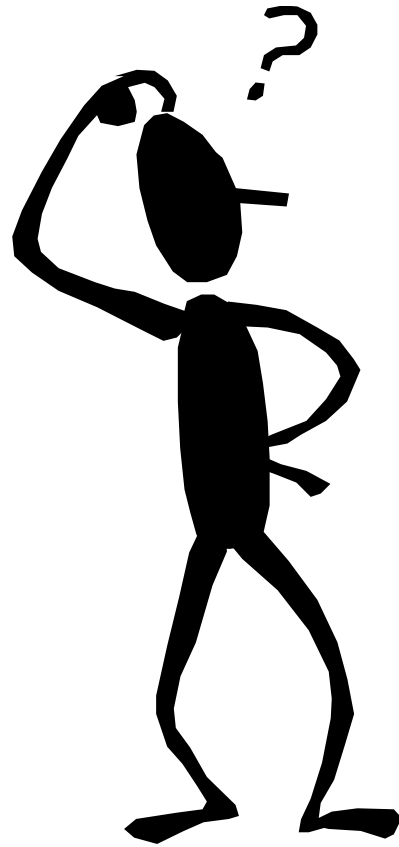
5% ?

7%

10%

Problem #4

Kevin is 19 and wants to have $10,000 saved by the time he's 25. Thanks to a generous gift from his grandparents, he currently has $6,500 invested in a bond paying 5%. If he makes no further deposits, will he reach his goal?

How could Kevin reach (or exceed) his goal?

Problem #5

Heather starts a Roth IRA at age 22. She plans to contribute $3,000 at the end of each year year for 45 years until age 67. How much will she have if her IRA investments earn 4% ?
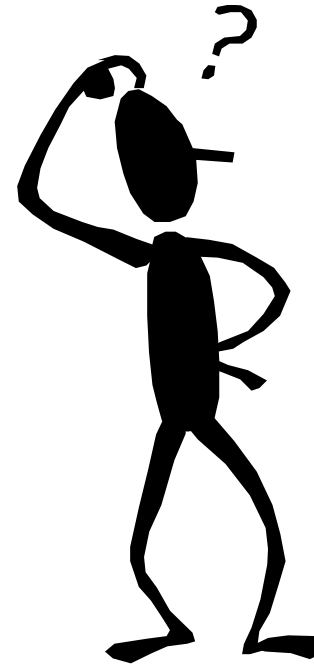
7% ?

9% ?

$3,000 a Year is About $60 a Week of Savings

How can Heather "find" $60 a week to invest in her Roth IRA?

Problem #6

Wendy and Sal just got married and want to save $15,000 for a down payment and closing costs on their first house. They intend to save $500 **per month** in CDs averaging a 4% annual return. How long will it take them to reach their goal? ?

Hints: Use a financial calculator…The answer is less than 5 years!

Problem #7

You quit smoking a pack a day of cigarettes and save $2,550 a year (savings of $7 per pack per day). You are 20. How much would you have if you invested the money in a stock index fund averaging a 10% return and don't touch it until age 55?
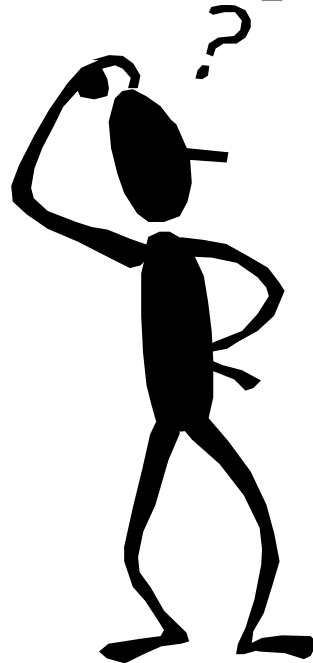
Problem #8

Lucky you…you won the NJ lottery. You have a choice between receiving $1,000,000 as an annuity of $50,000 a year over 20 years or taking $500,000 as a lump sum payment today. Ignoring taxes for the moment and, assuming a discount rate of 6%, which option is the best deal?

Problem #9

You want a $1 million dollars when you retire and will average a 10% return. How much do you need to save per year if you have…

- 40 years to save?
- 30 years to save?
- 20 years to save?
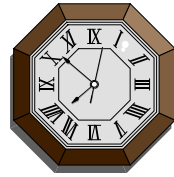- 10 years to save?

What do these results tell you?

Problem #10

- Your grandparents, both age 62, have a retirement fund of $100,000 saved to supplement their pension and Social Security. Assuming an average annual interest rate of 7%, how long will the fund last if they withdraw $750 per month? What would you advise them to do?

Two Take-Home Messages:

1. For every decade that you delay saving, the required investment **triples** (approx.)

2. Compound interest is NOT retroactive!!!