

## Time Value In-Class Exercise (Key)

1. You deposit \$1,000 in a mutual fund (a one-time deposit) that earns 8% compounded annually.

a. How much will you have in your account at the end of 10 years?

FV Factor (Table 1) for 8% for 10 years = 2.1589

$\$1,000 \times 2.1589 = \$2,158.90$  Your money more than doubled in 10 years!

b. At the end of 40 years?

FV Factor (Table 1) for 8% for 40 years = 21.7245

$\$1,000 \times 21.7245 = \$21,724.50$  Your \$1,000 grew to almost \$22,000!!

c. What if you had invested the \$1,000 in a savings account that earned 2% annually – how much would you have in your account after 40 years?

FV Factor (Table 1) for 2% for 40 years = 2.2080

$\$1,000 \times 2.2080 = \$2,208$  Your \$1,000 only grew to \$2,200. Compare this result to part c. where it grew to \$22,000!!

2. You just bought a plot of land for \$4,000/acre in hopes that it will increase in value 7% each year.

a. How much will the land be worth in 10 years assuming it increases in value by 7% each year?

FV Factor (Table 1) for 7% for 10 years = 1.9672

$\$4,000 \times 1.9672 = \$7,868.80$

b. How much will it be worth after 40 years?

FV Factor (Table 1) for 7% for 40 years = 14.9745

$\$4,000 \times 14.9745 = \$59,898$

3a. You want to have \$50,000 at the end of 10 years in order to make a down payment on your business. How much do you need to invest today (today only), earning 8% per year, to have \$50,000 in your account after 10 years?

This is a Present Value of a Lump Sum problem

PV Factor (Table 2) for 8% for 10 years = 0.4632

$\$50,000 \times 0.4632 = \$23,160$

If you invest \$23,160 today, it will grow to \$50,000 at the end of 10 years if you earn an annual return of 8%.

3b. Similar to 3a, you want to have \$50,000 at the end of 10 years. You can invest \$4,000/year for each of the next 10 years. Your investment will earn a return of 8% per year. Will you be able to reach your goal?

**This is a Future Value of an Annuity problem**

**FVA Factor (Table 6) for 8% for 10 years = 15.6455**

$$\$4,000 \times 15.6455 = \$62,582$$

**Yes, if you invest \$4,000/yr for the next 10 years, it will grow to \$62,582. This is greater than the \$50,000 you wanted to have.**

4. You want to contribute \$5,000/year to an IRA (Individual Retirement Account) – investing in assets that earn about 8 percent annually. How much will you have in the IRA after 20 years? 40 years?

**This is a Future Value of an Annuity problem**

**FVA Factor (Table 6) for 8% for 20 years = 49.4229**

$$\$5,000 \times 49.4229 = \$247,115 \text{ (but you only invested } \$100,000 \text{ over this time!)}$$

**FVA Factor (Table 6) for 8% for 40 years = 279.7810**

$$\$5,000 \times 279.7810 = \$1,398,905 \text{ (but you only invested } \$200,000 \text{ over this time!)}$$

5. The average America family has annual living expenses (food, rent, utilities, etc.) of \$50,000 per year. Let's assume that the annual inflation rate is 3% per year. How much will it cost an average American family to have the same level of living (\$50,000/year) 50 years from now? (50 years is approximately when you will be retiring!)

**This is a Future Value of a Lump Sum question**

**FV Factor (Table 1) for 3% for 50 years = 4.3839**

**$\$50,000 \times 4.3839 = \$219,195$  (it will cost over 4 times as much for the same level of living – just due to inflation!!)**