**Activity 5.7.7 Investment Opportunities - Expectations versus Reality**

**Part I - Expectations**

1. Paul has $100. He hopes to see it grow into $1000 and has looked into several investment opportunities available to him:
* A Certificate of Deposit (CD) that will earn 1.22% per year, compounded daily.
* A savings account that earns a mere 0.2% compounded monthly.
* A desperate friend named Seth who promises if Paul gives him $100 today, Seth will pay Paul $10 per year for the rest of his life in thanks.

How long will it take Paul to get $1000 from each of these three options? Justify your answers.

**Part II - Reality: Savings**

1. Paul has an uncle whose stock earned an average 6.75% annually, compounded continuously, for the past ten years. It is currently worth $21,675. How much money did he initially invest to have this much today?
2. Paul’s cousin has had a savings account for 20 years, earning an average of 2.1% annually, compounded monthly, for that time period. It is now worth $15,000. How much did she invest initially to have this amount today?
3. Paul’s high school math teacher has had a stroke of luck in the stock market. $1000 that she invested 5 years ago has grown to $2100 already. If the interest was compounded daily, what was the average percent that her stock grew by yearly?
4. From January 1988 to January 2000, a mutual fund gained 8% annually. Then the fund lost 3% of its value each year for the next ten years straight. How much would a $10,000 investment in January 1988 be worth in January 2010 based on this information?

**Part III - Reality: Debt**

1. Paul, now realizing that he won’t have $1000 any time soon, goes out and buys a $1000 television with his new credit card that charges 13% interest annually, compounded monthly. Paul figures that he can come up with the money by the end of the year, so he skips his monthly payments.

a. How much will he actually pay if he wants to pay the full amount after 12 months?

b. Since a minimum payment is due each month, he will also be charged a flat $25 late fee each month he does not make a payment in addition to the interest. So in total how much will be pay?

1. The equation $P=\frac{rM}{1-(1+\frac{r}{12})^{-12t}}÷12$ tells how much the monthly payment *P* will be for a total mortgage amount *M* with annual interest rate *r* and number of years *t*. Paul’s father is looking at purchasing a $300,000 house and comparing two different mortgages available to him.
* 15-year mortgage at 3.5% APR
* 30-year mortgage at 4.5% APR
1. How much would each mortgage option’s monthly payment be?
2. How much *total money* would Paul’s father end up paying by the end of each loan’s term if he pays every monthly payment as calculated? Compare this to the initial $300,000 loan.