Introduction to Finance Worksheet 1

Problem 1. *Assuming a constant rate of interest r per period, the future value F of an investment P compounded n times per period and lasting t periods is given by*

$$F = P\left(1 + \frac{r}{n}\right)^{nt}.$$

Prove that as $n \to \infty$, the continuous compounding formula $F = Pe^{rt}$ is recovered.

Problem 2. *A credit card monthly minimum payment is computed by taking the maximum of 2.5% of the balance or up to $10, which ever is more. If you have a balance of $10k and an annual interest rate of 21%, how long will it take to pay off the balance?*

Problem 3. *Some credit cards offer a "payment holiday" one month per year, which means that you don't have to make a payment that month (although interest does accrue). Assuming the balance and interest rate in the previous problem, if you take you payment holiday every 12th month, how long will it take you to pay off your card if you only make the minimum payments?*

Problem 4. *Derive the amortization formula. Check your formula with your favorite online mortgage calculator by testing a few numbers. What is the difference in monthly payment for a $250k mortgage if the rate increases from 6% to 8%?*

Problem 5. *In a certain lottery, one can take the prize amount P split up into 30 equal payments (one payment up front and 29 annual payments thereafter), or one can take half of the prize amount up front in cash. At what interest rate are these equivalent in present value?*