

Worksheet Finance 4: Summary of Topics

1. Below are the formulas you will be given on Exam 3. For each scenario below, **plug in numbers into the appropriate formula** needed to calculate the value. Do **not** actually calculate the the value.

Formulas

$$A = P + I \qquad A = P(1 + rt) \qquad A = P \left(1 + \frac{r}{n}\right)^{(nt)} \qquad P = \frac{A}{\left(1 + \frac{r}{n}\right)^{(nt)}$$

$$P = \frac{d \left(1 - \left(1 + \frac{r}{n}\right)^{(-nt)}\right)}{\left(\frac{r}{n}\right)} \qquad d = \frac{P \left(\frac{r}{n}\right)}{\left(1 - \left(1 + \frac{r}{n}\right)^{(-nt)}\right)}$$

- (a) You want to take out a loan to buy a \$150,000 home. The bank offers a 30-year mortgage with an interest rate of 5.2% compounded monthly. What will the monthly payments be?
- (b) You loan your friend \$900. They agree to pay an annual interest rate of 4% **simple interest**. Eighteen months later, they repay the loan. How much did they pay you in total?
- (c) You deposit \$2000 in a savings account with an APR of 3.2% compounded quarterly. How much will the account be worth in 10 years?
- (d) Suppose an investment typically earns 10% interest compounded yearly. How much would your initial investment (or **principal**) need to be in order for the future value of the account to be worth \$100,000 at the end of 40 years?

2. For the questions below, **write out the appropriate calculation** and use a calculator to find the numerical answer.
- (a) Someone tells you that 2 years after depositing \$1200 in an account, the value of the account increased by 28%. How much money was added to the account over this 2-year period?

 - (b) A savings account earns 3% interest each year. If someone initially invests \$1400, what is the value of the account in 30 years?

 - (c) If you have a mortgage and you pay exactly \$1200 a month for 30 years, how much did you pay over the life of the mortgage?
3. These problems should be completed using a spreadsheet.
- (a) Suppose someone has a balance of \$2000 on their credit card which has an APR of 27% compounded monthly. Suppose the person pays the **minimum payment** which is typically interest plus 3% of the remaining balance. (In fact, the minimum payment usually has a lower bound of \$25 or similar but don't worry about this right now.)
 - i. How long will it take till the balance on the credit card drops below \$1000 assuming no additional purchases are added to the credit card?

 - ii. How much in total will have been paid to the credit card company at this point?

 - (b) (Bonus) Suppose you open a retirement account with an initial deposit of \$1000 and each month you add \$100. If this account earns 4% interest compounded monthly, how much money will be in the account in 30 years assuming there are no withdrawals?