

- 1) (5 points) Sleeping Beauty invests \$120 in Spinning Wheel Bank that offers a 0.325% simple interest rate and then immediately takes a nap for 20 years. When she wakes up with crazy bed head, how much interest did she earn and how much is in the account after that time? Be sure to label your answers.

Simple
interest

$$I = 120(0.00325)(20) = \underline{\$7.80}$$

$$A = 120 + 7.80 = \underline{\$127.80}$$

- 2) (5 points) If \$12,300 was deposited into an account that offered a 1.75% annual interest rate compounded monthly for 10 years, how much would be in the account after that time and how much interest was earned? Be sure to label your answers.

Compounded
Interest

$$A = 12,300 \left(1 + \frac{0.0175}{12}\right)^{12 \cdot 10} = \boxed{\$14,650.46}$$

total

$$14,650.46 - 12,300 = \boxed{\$2,350.46}$$

interest

- 3) (5 points) How much should be invested now so that in 15 years there will be \$8,300 in an account that offers a 2.35% annual interest rate compounded quarterly?

present
value

$$P = 8300 \left(1 + \frac{0.0235}{4}\right)^{-4 \cdot 15} = \boxed{\$5840.73}$$

- 4) (5 points) Which is a better way to invest? Option A: 6.3% compounded semi-annually or Option B: 6.25% compounded monthly? Write answer as a percent rounded to two decimal places.

A

$$APY = \left(1 + \frac{0.063}{2}\right)^2 - 1$$

$$= 6.40\%$$

B

$$APY = \left(1 + \frac{0.0625}{12}\right)^{12} - 1$$

$$= \boxed{6.43\%}$$

Better →

20

5) (6 points each) Presti borrowed \$125,000 for a home on a 30-year loan that carried a 6.75% annual interest rate compounded monthly. After 12 years, he was able to refinance down to a 15-year loan that carried a 2.85% annual interest rate compounded monthly.

a) Determine the monthly payment for the beginning 30-year loan:

Amort

$$PMT = \frac{125000 \left(\frac{0.0675}{12} \right)}{\left(1 - \left(1 + \frac{0.0675}{12} \right)^{-12 \cdot 30} \right)}$$

$$= \underline{\$810.75}$$

b) How much was left on the balance after paying for 12 years?

Amount Owed on A Loan

$$125000 \left(1 + \frac{0.0675}{12} \right)^{12 \cdot 12} - \frac{810.75 \left(\left(1 + \frac{0.0675}{12} \right)^{12 \cdot 12} - 1 \right)}{\left(\frac{0.0675}{12} \right)}$$

$$= \underline{\$101,220.87}$$

c) Determine the monthly payment for the new 15-year loan:

Amort

$$PMT = \frac{101220.87 \left(\frac{0.0285}{12} \right)}{\left(1 - \left(1 + \frac{0.0285}{12} \right)^{-12 \cdot 15} \right)}$$

$$= \underline{\$691.73}$$

d) How much money did Presti save by refinancing his mortgage?

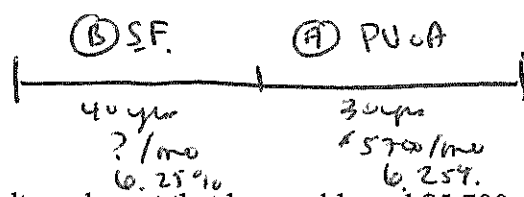
$$810.75 \cdot 12 \cdot 18 - 691.73 \cdot 12 \cdot 15$$

$$= \underline{\$50,610.60}$$

6) (4 points) Fill in the chart with the appropriate **name** of the formula. Assume that this chart is used for those formulas related to multiple deposits/payments:

	Working Years	Retirement Years
Know the Payment	IN	THE
Do Not Know the Payment	VIDEOS	!

28



7) (6 points each) Schmidt works out that he would need \$5,700 a month during his retired years. He is currently 25 years old and plans to work until his is 65. He assumes that he would need to make withdraws for 30 years past his retirement and that he's in a 20% tax bracket. Assuming he finds an account that will offer him a 6.25% annual interest rate compounded monthly for the entire duration of the account...

a) How much should he have in his account at retirement?

PVA

$$PV = \frac{5700 \left(1 - \left(1 + \frac{0.0625}{12}\right)^{-12 \cdot 30}\right)}{\left(\frac{0.0625}{12}\right)}$$

$$= \$925,749.68 \text{ After taxes}$$

$$0.80x = 925,749.68$$

$$\Rightarrow x = \boxed{1,157,187.10} \text{ before taxes}$$

b) How much should he deposit monthly during his working years to ensure he meets his goal?

SF

$$PMT = \frac{1,157,187.10 \left(\frac{0.0625}{12}\right)}{\left(1 + \frac{0.0625}{12}\right)^{12 \cdot 40} - 1}$$

$$= \boxed{\$542.79}$$

8) Balthier is 30 years old and is working as a local sky pirate. He is able to deposit \$525 a month into a Pirate Bank 401-k which offers a 7.25% annual interest rate. He does this for 30 years. After that time, he will retire. He wishes, over the next 25 years, to take out equal withdraws until the account is emptied. Assume the interest rate is the same after retirement.

a) (12 points) What are the equal withdraws he is able to take out?

FV

$$FV = \frac{525 \left(1 + \frac{0.0725}{12}\right)^{12 \cdot 30} - 1}{\left(\frac{0.0725}{12}\right)}$$

$$= \$672,993.98$$

tm out

$$PMT = \frac{672,993.98 \left(\frac{0.0725}{12}\right)}{\left(1 - \left(1 + \frac{0.0725}{12}\right)^{-12 \cdot 25}\right)} = \boxed{\$4864.45}$$

b) (2 points) How much did he deposit before retirement?

$$\$525 \cdot 12 \cdot 30 = \boxed{\$189,000}$$

c) (2 points) How much did he withdraw after retirement?

$$\$4864.45 \cdot 12 \cdot 25 = \boxed{\$1,459,335.00}$$

d) (2 points) How much interest did he earn overall?

$$1,459,335 - 189,000 = \boxed{\$1,270,335}$$

9) (3 points) What is the **major theoretical** distinction between Compound Interest and Future Value of an Annuity?

One gives out pennies on Halloween ☹️

33

10) (3 points each) Consider the problem below. For each part, only determine the formula that is needed to answer the question **but do not find the value, just write the name of the formula and explain why.**

For the first 10 years of Holly's life, her parents were able to deposit \$275 a month into an account that offered a 8.25% annual interest rate compounded monthly. After that time, the parents could no longer contribute to the account and just allowed the balance to sit there for the next 8 years at the same interest rate and rate of compounding.

a) Which formula would be needed to determine the amount of money in the account after the first 10 years? Explain why.

Future value because . . .

b) Which formula would be needed to determine the amount of money in the account after the 18 years? Explain why.

Compound interest because . . .

c) Now after those 18 years, Holly wishes to take equal withdraws from the account at the same interest rate over the next 5 years until the account has a balance of \$0. Which formula would be needed and why?

Amortization because . . .

11) Bella Goth goes furniture shopping several times during the month of October. Her Myshoono credit card has a \$0 balance as of October 1. Assume that the cycle ends on the first of each month.

a) (7 points) Based on the purchases below, fill in the last column of the table and determine the average daily balance for the account.

Day of Purchase	Item Purchased	Purchase Price	Daily Balance
October 1	Fyre Dryer	\$525.00	525
October 12	Elixir of Life	\$249.00	774
October 18	Zip Zap Microwave	\$189.00	963
October 22	Rubadubdub Rug	\$79.00	1042

11 ()
6 ()
4 ()
10 ()

$$\frac{11 \cdot 525 + 6 \cdot 774 + 4 \cdot 963 + 10 \cdot 1042}{31}$$

≈ 796.48

b) (3 points) Assuming there is a 14.25% annual finance charge on the card and that Bella made no payment on the card, what will be the finance charge for the month of October? Use the $I = Prt$ formula where t is the number of days in cycle divided by 365.

$$I = 796.48 (0.1425) \left(\frac{31}{365} \right) = 9.64$$

5/19