MATH 1240 Fall 2016 — Mike McCraith
Exam 1 — September 28, 2016

DO NOT TURN THIS PAGE UNTIL YOU ARE INSTRUCTED TO DO SO

- Write your name below on the space provided.
- This test has a total of 6 pages.
- Work the problem in the space provided. If you need more space, write on the back of the test.
- To insure maximum credit, show your work. In general, full credit will not be given for unsupported answers.
- Look only at your test. Don't give me the impression that you are cheating.
- Be sure to write neatly. If I cannot read what was written, do not expect the problem to be graded.
- If you finish early, go over the test again.

Good luck!

Number	Maximum	Score
1	8	
2	8	
3	4	
4	4	
5	20	
6	8	
7	15	
8	10	
9	4	
10	9	
11	10	
Total	100	

Name _____

CIRCLE FINAL ANSWERS

ROUND ANSWERS TO TWO PLACES AS NEEDED

1) (4 points each) Suppose that $3,750 is deposited into an account that offers a 1.75% simple interest rate. After 8 years, determine...

a) How much interest is earned after that time:

b) How much is in the account after that time:

2) (4 points each) Penny takes out a 5-year loan for $8,350 after losing a game of poker to a scary clown. The bank where the loan came from has a 3.15% annual interest rate compounded monthly. Determine:

a) How much she'll pay total after 5 years:

b) The amount she paid in interest:

3) (4 points) How much would you have to invest now so that in 54 **months**, there is $12,000 in an account that has a 2.85% annual interest rate compounded monthly?

4) (4 points) Which is a better way to invest? Option A: 6.48% compounded semi-annually or Option B: 6.3% compounded monthly? Write answer as a percent rounded to three decimal places.

5) (4 points each) Dr. Artz found a home for $315,000. He put down 20% and financed the rest on a 30-year loan that carried a 6.25% annual interest rate compounded monthly. After 10 years, he was able to refinance down to a 15-year loan that carried a 3.15% annual interest rate compounded monthly.

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

b) How much was left on the balance after paying for 10 years?

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

d) Compare the amount Dr. Artz would have paid over the remaining 20 years of the original loan to the amount he did pay for the refinanced 15-year loan. How much did he save?

e) How much total did Dr. Artz pay for the home?

6) (8 points) Nikki takes out a loan of $145,000 for a condo. Her loan has a 3.25% annual interest rate compounded monthly for 15 years. Chart the first two months of the loan given the monthly mortgage payment is $1018.87. Be sure to show the numbers that are being multiplied and subtracted. Round to two decimal places as you work:

End of Month	Interest	Principal	Balance
1			
2			

7) After casting all of the unforgivable curses, Brian, a Slytherin accountant, decides to set up a 401(k). For the next 25 years, he plans on depositing $300 a month into the account that offers a 10.99% annual interest rate compounded monthly. After that time, he plans to retire and withdraw an equal amount from the account for the next 20 years at the same interest rate until the balance is $0.

a) (9 points) What are the equal withdraws he is able to take out?

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

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

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

8) (5 points each) Schmidt works out that he would need $4,000 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 25% tax bracket. Assuming he finds an account that will offer him a 6.25% annual interest rate compounded monthly…

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

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

9) (4 points each) What is the **major theoretical** distinction between Compound Interest and Future Value?

10) (3 points each) Short answer. Determine the name of the formula needed for each part of the problem. **DO NOT SOLVE THE PROBLEM.** Also, explain why you picked the formula.

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?

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

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?

11) Mike, a professional gamer of great games (that is, non-X-box games), will be buying several necessary items during the month of December. He'll use his brand new Chocobo Credit Card that has a $0 balance as of December 1st. Assume the cycle resets on the 1st of each month.

a) (8 points) Based on the purchases below, fill in the last column and determine the average daily balance for the account:

Date of Purchase	Item Purchased	Purchase Price	Daily Balance
December 1	The Witness	$39.99	
December 12	Persona 5	$59.99	
December 19	Final Fantasy XV	$79.99	
December 23	The Last Gaurdian	$99.99	

b) (2 points) Assuming there is a 12.75% annual finance charge on the card and that Mike made no payment on the card, what will be the finance charge for the month of July? Use the $I=Prt$ formula where t is the number of days in the period divided by 365.

CHAPTER 1 FORMULAS

Simple Interest: $I = Prt$

Amount of Simple Interest: $A = P + Prt = P(1 + rt)$

Compound Interest: $A = P\left(1 + \frac{r}{n}\right)^{nt}$

Present Value: $P = A\left(1 + \frac{r}{n}\right)^{-nt}$

Annual Percentage Yield: $APY = \left(1 + \frac{r}{n}\right)^{n} - 1$

Amortization: $PMT = \frac{PV\left(\frac{r}{n}\right)}{\left(1 - \left(1 + \frac{r}{n}\right)^{-nt}\right)}$

Amount Owed on a Loan: $A\left(1 + \frac{r}{n}\right)^{nt} - \frac{PMT\left(\left(1 + \frac{r}{n}\right)^{nt} - 1\right)}{\left(\frac{r}{n}\right)}$

Present Value of an Annuity: $PV = \frac{PMT\left(1 - \left(1 + \frac{r}{n}\right)^{-nt}\right)}{\left(\frac{r}{n}\right)}$

Future Value of an Annuity: $FV = \frac{PMT\left(\left(1 + \frac{r}{n}\right)^{nt} - 1\right)}{\left(\frac{r}{n}\right)}$

Sinking Fund: $PMT = \frac{FV\left(\frac{r}{n}\right)}{\left(\left(1 + \frac{r}{n}\right)^{nt} - 1\right)}$

Average Daily Balance: $ADB = \frac{(\text{number of days})(\text{beginning balance}) + (\text{number of days})(\text{new balance}) + \ldots}{\text{total number of days}}$