Math 1300 Fall 2013
Quiz 1
Friday August 30 2013
No Work = No Credit

Name: _____ **Student Number:** _____

Signature: _____

Instructor: _____ **Section:** _____

Instructions: Answer all questions and show all of your work.

Problem	Points	Student's Score
1	2	
2	3	
3	5	
Total:	10	

Potentially Helpful Formulae:

$F = (1+i)^n P$

$P = \dfrac{F}{(1+i)^n}$

$\text{APY} = (1+i)^m - 1$

$F = \dfrac{(1+i)^n - 1}{i} \cdot R$

$PV = \dfrac{1-(1+i)^{-n}}{i} \cdot R$

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1. (2 points) A recent college graduate would like to have $25,000 available 10 years in the future for a downpayment on a house. How much should this person invest now if he or she can earn 6.13% compounded monthly?

Solution:

This is a compound interest account, where:

1. $F = \$25,000$
2. $n = 10 \times 12 = 120$
3. $i = 0.0613/12$

Using the equation $F = P(1+i)^n$, we get that $P = \$13,564.23$

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2. (3 points) You are opening a savings account with $1,000 and considering two different types of accounts. The UMizzou account pays 3.15% compounded semiannually. The Tiger account pays 3.13% compounded daily. Which account is a better investment?

Solution:

We are comparing two compound interest accounts.

For the UMizzou account, we have:

1. $P = \$1,000$
2. $n = 1 \times 2 = 2$
3. $i = 0.0315/2$

Using the equation $F = P(1+i)^n$, we get that $F = \$1031.75$

For the Tiger account, we have:

1. $P = \$1,000$
2. $n = 1 \times 365 = 365$
3. $i = 0.0313/365$

Using the equation $F = P(1+i)^n$, we get that $F = \$1031.79$

The Tiger account is a better investment.

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3. A person will have $\$305,168$ saved when he or she retires. Assume that the money will be invested at 4.65% compounded monthly.

   (a) (2 points) How much can this person take out per month for the 20 years following his or her retirement date?

   Solution:
   This is a decreasing annuity, with:

   1. $PV = \$305,168$
   2. $i = 0.0465/12$
   3. $n = 20 \times 12 = 240$

   Using the formula $PV = R\left(\frac{1-(1+i)^{-n}}{i}\right)$, we get that they can take out $R = \$1,955.44$.

   (b) (3 points) Suppose this person would like to take out \$3000 per month for 20 years following retirement. How much must he or she have saved at retirement?

   Solution:
   This is a decreasing annuity, with:

   1. $R = \$3,000$
   2. $i = 0.0465/12$
   3. $n = 20 \times 12 = 240$

   Using the formula $PV = R\left(\frac{1-(1+i)^{-n}}{i}\right)$, we get that they must have saved $PV = \$468,183.13$.