# Quiz 3 - Financial Math 

Math 1030 - Dylan Zwick's Class
Fall 2007

Name:

Here are the formulas you may need:
Compound Interest Formula for Annual Compounding

$$
A=P \times(1+A P R)^{Y}
$$

## Compound Interest Formula for Interest Paid n Times Per Year

$$
A=P\left(1+\frac{A P R}{n}\right)^{n Y}
$$

Compound Interest Formula for Continuous Compounding

$$
A=P \times e^{A P R \times Y}
$$

Savings Plan Formula (Regular Payments)

$$
A=P M T \times \frac{\left[\left(1+\frac{A P R}{n}\right)^{n Y}-1\right]}{\left(\frac{A P R}{n}\right)}
$$

## Variable Definitions

A = Accumulated Amount
P = Starting Principal
APR $=$ Annual Percentage Rate (express as a decimal)
$\mathrm{Y}=$ Number of Years
$\mathrm{n}=$ Number of Compounding Periods per Year PMT = Regular Payment

## 1. Different Compounding Periods - 15 points

Suppose you invest $\$ 2,500$ in an account that generates compound interest with an APR of $5 \%$ for 30 years.
(a) If your account compounds every year, how much money will you have in the account after 30 years? ( 3 points)
(b) If your account compounds every month, how much money will you have in the account after 30 years? ( 3 points)
(c) If your account compounds continuously, how much money will you have in the account after 30 years? ( 3 points)
(d) What is the APY (annual percentage yield) of the account if it compounds continuously? (3 points)
(e) Suppose that instead of generating compound interest the account generated simple interest with an APR of $5 \%$. How much money would you have in the account after 30 years? (3 points)

## 2. Savings Plan - 10 points

(a) Suppose you start a retirement savings plan when you're 30 and want to retire with $\$ 2,000,00035$ years later. If you invest in an account with a $4.5 \%$ APR compounded monthly, and you make monthly payments, how much money will you need to put away every month in order to retire with $\$ 2,000,000$ ? (5 points)

Note - The savings plan formula assumes compounding at the same rate as you make payments. This is the case for this problem.
(b) What is the total amount of money that you invest in this account over the 35 years? ( 2 points)
(c) Suppose that instead of putting away the money in monthly installments you invest one lump sum at the start and let it accumulate interest for 35 years in this account. How much money would you need in this lump sum in order to have $\$ 2,000,000$ after 35 years? (3 points)

## 3. Extra Credit - 5 points

(a) Suppose you invest $\$ 5,000$ in a compound interest savings account with an APR of $5 \%$ that compounds annually. After $Y$ number of years you have $\$ 17,778.36$ in your account. What is $Y$ ? (Hint - logarithms) (4 points)
(b) Name one character that appears in more than 3 of Shakespeare's plays. (1 point)

More Extra Credit - Wednesday of next week is Halloween. We will have a costume contest the first 5 minutes of class. The people with the top 3 costumes, chosen democratically, will be awarded extra credit points on this quiz.

Best Costume - 3 points
Runner Up - 2 points
Second Runner Up-1 point

