Math 11.07 Quiz Ch 6.1-6.4 Winter 2019 NAME Last KEY **First** _____

TURN OFF & PUT AWAY ALL CELL PHONES & other devices, except your calculator.
You can not use a cell phone as your calculator or for any other reason, during this quiz.
You are permitted **one page of notes, 1 sided handwritten , or one half page 2 sided**

Show WORK : Show how you set up each problem, writing out the formulas with the numbers substituted into them. Then evaluate all answers.

- Neat logically organized understandable work is needed; partial credit can not be assessed if work is missing or is not clear to understand. Different rounding may lead to different answers, so it is important to show your work
- All periodic payments are at the end of each period, Payment periods are always the same as the compounding period (same as we've done in class and homework.)
- **State monetary values as answers to dollars and cents.** Keep 4 or 5 decimal places in the numbers you use during your work on a problem. It will help maintain accuracy.

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1. *(3 points)* A business expects to purchase new equipment in 5 years that will cost $90,000. The business owner plans to deposit money into a sinking fund twice each year (semiannually) for 4 years. The sinking fund earns 5.7% interest, compounded semiannually. **Find the amount of the semiannual payment the owner must make into the sinking fund in order to have $90,000 at the end of 4 years.** *Show Work!*

If you used t=4 years

$$A = m\frac{\left[\left(1+\frac{r}{n}\right)^{nt}-1\right]}{(r/n)}$$

$$90000 = m\frac{\left[\left(1+\frac{.057}{2}\right)^{2*4}-1\right]}{(.057/2)}$$

$$90000 = m(8.84514)$$

$$m = \$10{,}175.08$$

If you used t=5 years

$$A = m\frac{\left[\left(1+\frac{r}{n}\right)^{nt}-1\right]}{(r/n)}$$

$$9000 = m\frac{\left[\left(1+\frac{.057}{2}\right)^{2*5}-1\right]}{(.057/2)}$$

$$90000 = m(11.38500)$$

$$m = \$7905.14$$

Given:
A=90000
r=.057
n=2

Find m

2a. *(2 points)* How much money should be deposited now, as a lump sum, into an investment earning **5.5% simple interest** to accumulate to $7000 at the end of 6 years? *Show work.*

$$A = P(1+rt)$$

$$7000 = P(1+.055*6)$$

$$7000 = P(1.33)$$

$$P = \$5263.16$$

Given: A=7000
t=6
r=.055 simple interest

Find: P

2b. *(2 points)* How much money should be deposited now, as a lump sum, into an investment earning **5.5% interest compounded continuously** to accumulate to $7000 at the end of 6 years? *Show work.*

$$A = Pe^{rt}$$

$$7000 = Pe^{.055*6}$$

$$7000 = P(1.39097)$$

$$P = \$5032.47$$

Given: A=7000
t=6
r=.055 compounded continuously

Find: P

2c. *(3 points)* How much money should be deposited now, as a lump sum, into an investment earning **5.5% interest compounded quarterly** to accumulate to $7000 at the end of 6 years? *Show work.*

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

$$7000 = P\left(1+\frac{.055}{4}\right)^{4*6}$$

$$7000 = P(1.38784)$$

$$P = \$5043.81$$

Given: A=7000
t=6
r=.055 compounded quarterly
n=4

Find: P

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3. (*3 points*) **Find the amount of the quarterly payment on loan of $8000** with payments made at the end of each quarter over 5 years at a loan interest rate of 5% compounded quarterly. *Show Work!*

Given: Loan = P = 8000 $n=4$ $t=5$ $r=.05$

Find: m

$$P\left(1+\frac{r}{n}\right)^{nt} = m\frac{\left[\left(1+\frac{r}{n}\right)^{nt}-1\right]}{(r/n)}$$

$$8000\left(1+\frac{.05}{4}\right)^{4*5} = m\frac{\left[\left(1+\frac{.05}{4}\right)^{4*5}-1\right]}{(.05/4)}$$

$$8000(1.282037) = m(22.56298)$$

$$10256.29785 = m(22.56298)$$

$m = \$454.56$ quarterly loan payment

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4. (*4 points*) Anand wants to buy a car and has $6,000 for a down payment.
He can afford to pay $225 per month in payments on the car loan.
Assume he has a 6 year loan with an interest rate of 5.3% compounded monthly.
Find the amount of loan and the price of the car that Anand can afford. *Show Work!*

Given: $m=225$ $t=6$ $r=.053$ $n=12$

Find: P = loan amount and P + 6000 = car price

$$P\left(1+\frac{r}{n}\right)^{nt} = m\frac{\left[\left(1+\frac{r}{n}\right)^{nt}-1\right]}{(r/n)}$$

$$P\left(1+\frac{.053}{12}\right)^{12*6} = 225\frac{\left[\left(1+\frac{.053}{12}\right)^{12*6}-1\right]}{(.053/12)}$$

$$P(1.37341) = 225(84.54663)$$

$$P(1.37341) = 19022.99136$$

$P = \$13850.92$ loan amount

So car price is:
P + 6000
= 13850.92 + 6000
= $19850.92 price

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5. (*3 points*) $12,500 is invested today at an interest rate of 4.2% compounded annually
How long will it take to accumulate to $37,500?
Show appropriate ALGEBRA work to solve this.
Trial and error or guess and check are not acceptable.
State your answer to the nearest tenth of a year (1 decimal place)

Given: $P=12500$ $A=37500$ $n=1$ $r=.042$

Find: t

$A = P\left(1+\frac{r}{n}\right)^{nt}$ with $n=1$ becomes $A = P(1+r)^t$

$$37500 = 12500(1+.042)^t$$

$$\frac{37500}{12500} = 1.042^t$$

$$3 = 1.042^t$$

$$t = \log_{1.042} 3 = \frac{\ln(3)}{\ln(1.042)} = 26.7 \text{ years}$$