Name: _____

MA111
Ch. 10 Practice Exam
2012-02-15

Instructions: No books or notes may be used on this exam. You will have 50 minutes to answer all of the following questions. Additional paper is available if necessary. Please write legibly and keep your paper as organized as possible. Show all of your work! Answers without work or explanation will not receive full credit. Please use complete sentences where appropriate to explain your responses. Each part is worth 25% of the exam.

Part I: Matching

1 Simple interest formula

2 Compound interest formula

3 Fixed deferred annuity formula

4 Installment loan formula

5 Present value of 20 years worth of monthly payments of \$100 at 5% monthly interest

6 Future value of \$100 after one period of 5% and three periods of 20% interest

7 Present value of three monthly payments of \$100 at 5% monthly interest

8 Future value of three monthly payments of \$100 at 5% monthly interest

(1) $F = P(1+pT)$, F is future value, P is present value, p is periodic interest rate, T is number of periods

(2) $F = P(1+p)^T$, F is future value, P is present value, p is periodic interest rate, T is number of periods

(3) $F = M\frac{(1+p)^T-1}{p}$, F is future value, M is periodic payment, p is periodic interest rate, T is number of periods

(4) $P = Mq\frac{1-q^T}{1-q}$, P is present value, M is periodic payment, p is periodic interest rate, T is number of periods, $q = 1/(1+p)$ helps discount future payments into the present

(5) $\$100(1/1.05)\frac{1-(1/1.05)^{240}}{1-(1/1.05)}$

(6) $\$100(1.05)(1.2)^3$

(7) $\$100/(1.05) + \$100/(1.05)^2 + \$100/(1.05)^3$

(8) $\$100(1.05)^2 + \$100(1.05) + \$100$

Part II: Simple interest

1. Hermes's grandmother wants him to be able to afford his college textbooks in 2021, and so gave him a 10 year savings bond today. Its present value is \$300 and it earns 1% simple interest annually. How much will it be worth 10 years from now?

$P = 300$

$p = 1\%$ per year

$T = 10$ years

$F = P(1 + pT)$

$F = 300(1 + (1\%)(10))$

$F = 300(1 + (0.01)(10))$

$F = 300(1 + 0.1)$

$F = 300(1.1) = 330$

1% of \$300 is \$3
\$3 per year for 10 years
is \$30 of interest, so
\$330 total

2. Bills are due and you've got no money, but you'll have plenty of money next month. Your Kentucky Utilities bill is \$47.80 now, but if you pay it late it will be \$50.19. You have a 24% APR credit card (2% interest per month) that is carrying a balance (so interest will apply to any current purchase), so you could pay the bill with your credit card, and then pay off that portion of the credit card in one month.

Which is the cheaper way to borrow \$47.80 for one month? (a) late fee or (b) credit card.

Be sure to explain (for instance by calculating how much each costs at the end of the month, or by calculating the interest rate on each). Ignore any outside influences, just compare the interest charges.

(a) will cost \$50.19

(b) will cost \$47.80 + 2% of \$47.80, $47.80(1.02) = \$48.76$

$P = 47.80$

$p = 2\%$ per month

$T = 1$ month

$F = P(1+pT) = 47.80(1+0.02)$

(b) is cheaper by about \$1.40 (of interest)

Part III: Compound interest

1. Hermes's grandmother invests \$200 at 24.00% APR compounded monthly. How much is the investment worth after 1 year?

$P = \$200$

$p = 24\%$ per year, compounded monthly $= 2\%$ per month

$T = 1$ year $= 12$ months

$$F = P(1+p)^T = 200(1.02)^{12} = \$253.65$$

2. More bills are due. You need another \$20, and you can't pay it back for 2 months. You could pawn your iPod (1% per month simple interest plus a \$5 fee) or leave it on your credit card (2% per month compound interest, but no fee).

Which is the cheaper way to borrow the \$20 for two months: (a) pawn shop or (b) credit card. Be sure to explain (for instance by calculating how much each costs at the end of the two months, or by comparing effective interest rates (hard)). Ignore any outside influences, just compare the interest charges.

(a) $\$20 + (0.01)(2)(\$20) + \$5 = \$25.40$

(b) $\$20(1.02)^2 = \$20.81$

(b) is cheaper by about \$4.60

Part IV: Installment loans

1. Hermes's grandmother owes $100.00 at 60%APR (5% per month) and plans on paying back $36.72 each month. Make a table describing how much she owes at each month.

	Previous Balance	Finance Charge	Repayment	Ending Balance
1st month	$100	$100(0.05) = $5	$36.72	100 + 5 − 36.72 = 68.28
2nd month	$68.28	$68.28(0.05) = $3.41	$36.72	68.28 + 3.41 − 36.72 = 34.97
3rd month	$34.97	$34.97(0.05) = $1.75	$36.72	34.97 + 1.75 − 36.72 = 0
4th month	$0			

2. Now that the bills are paid (insofar as you've borrowed enough money to keep them from hassling you for another month or two) you decide to reward yourself with a 3D television. You could rent-to-own for 12 monthly payments of $105.00, or you could just put $1000.08 on your other credit card at 36% APR (3% per month) and pay it back over 12 months in 12 equal payments (that you'll need to figure out).

Which is the cheaper way to buy the TV over 12 months: (a) rent-to-own, or (b) credit card.

Be sure to explain (for instance by calculating how much each costs each month, or by comparing effective interest rates (hard)). Ignore any outside influences, just compare the interest charges.

(a) will cost $105 every month for 12 months

(b) will cost M where $1000.08 = M\,\frac{1}{1.03}\left(\left(\frac{1}{1.03}\right)^{12} - 1\right)\Big/\left(\frac{1}{1.03} - 1\right)$

$1000.08 = M(9.954003993567565\ldots)$

$M = 1000.08/(9.954003) = \$100.47$

so credit card will cost $100.47 each month for 12 months,

(b) is about $4.50 cheaper per month.

(a) $(105)(12) = 1260$ total (spread over 12 months, evenly)

vs (b) $(100.47)(12) = 1205.64$ total (spread over 12 months, evenly)

save about $54 total (spread over 12 months, evenly)