

DEPARTMENT OF MATHEMATICS

Ma 162 Third (practice) Exam April 8, 2013

Instructions: No cell phones or network-capable devices are allowed during the exam. The test has been carefully checked and its notation is consistent with the homework problems and practice exam. No additional details will be provided during the exam.

Problem	Maximum Score	Actual Score
1	20	
2	20	
3	20	
4	20	
5	10	
6	10	
Total	100	

NAME: _____ Section: _____

Last four digits of Student ID: _____

- Simple Interest: $I = Prt$. Accumulation: $A = P(1 + rt)$.
- Compound Interest Accumulation: $A = P(1 + i)^n$. Present value: $P = A(1 + i)^{-n}$.
- Effective rate: $r_{eff} = (1 + \frac{r}{m})^m - 1$.
- Annuity: Sum: $S = R \frac{(1+i)^n - 1}{i}$. Present value: $P = R \frac{1 - (1+i)^{-n}}{i}$.
- Set counting: Two sets: $n(A \cup B) = n(A) + n(B) - n(A \cap B)$
 $n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B) - n(B \cap C) - n(C \cap A) + n(A \cap B \cap C)$.

1. Basic time value of money. Multiple choice. Work is not graded. Clearly indicate the most correct choice in each row of answers. Unclear indications are worth no credit.

\$2,437.00 is invested in an account earning a nominal interest rate of 1.50% APR compounded bi-weekly. How much is the account worth after 5 years?

- (a) \$2,625.75 (b) \$2,626.00 (c) \$2,626.25 (d) \$2,626.50 (e) \$2,626.75

How much needs to be invested in an account earning a nominal interest rate of 1.50% APR compounded quarterly in order for the account to be worth \$1,373.10 after 9 years?

- (a) \$12.00 (b) \$120.00 (c) \$1,200.00 (d) \$12,000.00 (e) \$120,000.00

How long does \$75.00 need to be invested in an account earning a nominal interest rate of 1.50% APR compounded monthly in order for the account to be worth \$87.13?

- (a) 10 years (b) 11 years (c) 12 years (d) 13 years (e) 14 years

If \$75.00 is invested monthly in an account earning a nominal interest rate of 1.50% APR compounded monthly. How much is the account worth in 6 years?

- (a) \$467.22 (b) \$1,879.80 (c) \$5,646.77 (d) \$12,238.97 (e) \$24,481.62

How much must be invested in an account earning a nominal interest rate of 1.50% APR compounded monthly, in order to withdraw \$75.00 monthly for 7 years?

- (a) \$0.94 (b) \$67.53 (c) \$75.00 (d) \$5,976.99 (e) \$6,638.27

How long must monthly payments of \$175.00 be invested in an account earning a nominal interest rate of 1.50% APR compounded monthly in order for the account to be worth \$17,837.73 by the end?

- (a) 8 years (b) 32 years (c) 128 years (d) 512 years (e) 2,048 years

2. Basic time value of money. Multiple choice. Work is not graded. Clearly indicate the most correct choice in each row of answers. Unclear indications are worth no credit.

\$2,437.00 is invested in an account earning a nominal interest rate of 15.00% APR compounded bi-weekly. How much is the account worth after 5 years?

- (a) \$5,148.02 (b) \$51,480.22 (c) \$514,802.22 (d) \$5,148,022.18 (e) \$51,480,221.80

How much needs to be invested in an account earning a nominal interest rate of 15.00% APR compounded quarterly in order for the account to be worth \$4,515.99 after 9 years?

- (a) \$230.63 (b) \$1,200.00 (c) \$4,515.99 (d) \$88,426.42 (e) \$332,777.41

How long does \$75.00 need to be invested in an account earning a nominal interest rate of 15.00% APR compounded monthly in order for the account to be worth \$333.02?

- (a) 0.04 years (b) 0.16 years (c) 0.63 years (d) 2.5 years (e) 10 years

If \$75.00 is invested monthly in an account earning a nominal interest rate of 15.00% APR compounded monthly. How much is the account worth in 6 years?

- (a) \$656.53 (b) \$2,838.88 (c) \$8,675.52 (d) \$18,892.25 (e) \$37,866.88

How much must be invested in an account earning a nominal interest rate of 15.00% APR compounded monthly, in order to withdraw \$75.00 monthly for 7 years?

- (a) \$3,886.16 (b) \$3,886.41 (c) \$3,886.66 (d) \$3,886.91 (e) \$3,887.16

How long must monthly payments of \$175.00 be invested in an account earning a nominal interest rate of 15.00% APR compounded monthly in order for the account to be worth \$32,137.19 by the end?

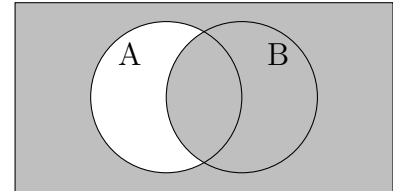
- (a) 8 years (b) 9 years (c) 10 years (d) 11 years (e) 12 years

3. Basic counting. Multiple choice. Work is not graded. Clearly indicate the most correct choice in each row of answers. Unclear indications are worth no credit.

Let H be the set of bears who eat honey, and let F be the set of bears who eat fish. What is the most accurate description of $H - F = H \cap F^c$?

- (a) The set of fish that are not eaten by bears
- (b) The set of bears that are not eaten by fish
- (c) The set of bears that eat honey and fish
- (d) The set of bears that eat honey but not fish
- (e) The set of bears that eat honey or fish or both

Consider the Venn Diagram to the right, and choose the best description of the shaded region:



- (a) $A \cup B$
- (b) $A \cap B$
- (c) $A - B$
- (d) $A^c \cap B$
- (e) $A^c \cup B$

Ace Novelty sells exactly three products. 70% of their customers have bought the first product, 60% have bought the second product, but 10% of their customers have only bought the third product. How many customers have bought both the first and second product?

- (a) 10%
- (b) 40%
- (c) 50%
- (d) 60%
- (e) 70%
- (f) 130%

King Novelty sells exactly three products. 70% of their customers have bought the first product, 60% have bought the second product, 50% have bought the third product. 30% have bought both the first and second, 25% have bought both the first and third, and 20% have bought both the second and third. How many have bought all three products?

- (a) 1%
- (b) 5%
- (c) 10%
- (d) 20%
- (e) 80%

Queen Novelty sells exactly three products. A person has either bought a product or not. How many possibilities are there for which products a customer has bought?

- (a) 3
- (b) 4
- (c) 6
- (d) 7
- (e) 8
- (f) 9

How many ways are there to rearrange the letters of the word BUSINESS?

- (a) 6720
- (b) 13440
- (c) 20160
- (d) 40320
- (e) 208827064576

How many ways are there to rearrange the letters of the word HIPPOPOTAMUS?

- (a) 12
- (b) 362880
- (c) 39916800
- (d) 79833600
- (e) 119750400

You must show work to gain credit. Answers without justification receive no credit.

5. \$100 is invested every month for five years into an account earning a nominal interest rate of 12% APR compounded monthly for the first three years, and 18% APR compounded monthly for the last two years.

(a) How much is the account worth at the end of the five years?

(b) How much would one need to invest (in an account earning the same interest rates) at the beginning of the five years (as a single payment) in order to have \$10,000 by the end of the five years?

You must show work to gain credit. Answers without justification receive no credit.

6. (a) How many ways are there to arrange 3 letters from the word HIPPOPOTAMUS?

(b) If you roll three six-sided dice (one white, one red, one blue), how many ways are there to get “doubles” but not “triples”? (That is, two of the three numbers rolled are the same and one of the three is different.)