CREDIT FOR PRIOR LEARNING EXAMINATION

MAT 114 – FINITE MATHEMATICS

Exam Details

This exam has three parts:
- linear functions and matrix algebra
- linear programming
- counting and probability

You must score a minimum of 60% on each part and a minimum of 70% overall to earn credit for the course. You will have two hours to complete the exam. You will need a non-graphing scientific calculator. Graphing calculators may not be used. On some of the counting and probability problems, you will be asked to leave your answer in the form of factors, C(n, r), P(n, r), or factorials and give a clear explanation of what each factor in your answer represents. You will not actually calculate these answers.

Below are the objectives for each section of the text that are included on the exam. In addition to the concepts, you also need to be familiar with the notation.

Section 1.3
- Read a function from a graph or table. Find a missing value.
- Graph linear equations.
- Write a linear function given 2 points.
- Write linear models for application problems.

Section 3.1
- Solve systems of linear equations in two variables graphically.
- Solve systems of linear equations in two variables using the algebraic method.

Section 3.2
- Solve systems of linear equations by putting an augmented matrix in reduced row echelon form.
- Understand when matrices have one, infinitely many, or no solutions.
- Write the general solution of a system with infinitely many solutions with a parameter or parameters.

(Continued on next pages)

Course Description

MAT 114 Finite Mathematics
(3 credits)

MAT 114 is a 3 credit-hour course on the topics of linear functions, matrix algebra, linear programming, and probability. Emphasis on applications to business.

Study Resources

Text: Finite Mathematics, 7th edition by Waner and Costenoble

Testing Services
University Center 101
(859) 572 – 6373
testing@nku.edu

Exam Details Continued

Section 3.3

- Carefully define variables in an application problem. For example, x = the number of hamburgers to make, rather than x = hamburgers. The numeric solution should make sense when substituted into the variable in the definition. Using the example above,
  5 is the number of hamburgers to make, rather than 5 is hamburgers.
- Set up equations and solve application problems.

Section 4.1

- Find the dimensions of a matrix.
- Identify a specified entry.
- Add and subtract matrices.
- Explain when matrices cannot be added or subtracted.
- Multiply a matrix by a scalar.
- Write the transpose of a matrix.

Section 4.2

- Multiply matrices.
- Explain when matrices cannot be multiplied.
- Understand the identity matrix.

Section 4.3

- Find the inverse of a matrix.
- Write a system of linear equations as a matrix equation and solve using matrix inversion.

Section 5.1

- Graph the region defined by linear inequalities.
- State whether a feasible region is bounded or unbounded.
- Find the corner points of a feasible region.

Section 5.2

- Solve a linear programming problem graphically. This includes graphing the feasible region, finding and testing the corner points in the objective function to determine the optimal solution and optimal value.
- Translate a word problem into a maximization or minimization objective function and write all of the inequalities for the constraints.

Section 5.3

- Write the initial tableau for a standard maximization linear programming problem. This includes writing the inequalities as equations using slack variables and writing the objective function in standard form.
- Find the pivot of a simplex tableau. Use the pivot to clear the column and write the new tableau.
- Write the solution for any simplex tableau. Know if the solution is the optimal solution.
- Solve application problems.

Section 5.4

- Write the initial tableau for a nonstandard maximization linear programming problem. This includes writing the inequalities as equations using slack and/or surplus variables and writing the objective function in standard form.
- Understand the use of stars in the simplex tableau, how to choose the pivot in a simplex tableau with stars and whether the solution is feasible.
- Convert minimization problems to maximization problems by rewriting the objective function as p = -c and maximizing p.
- Solve application problems.

Exam Details Continued

Section 6.1

- Write sets including elements, subsets, proper subsets, empty set, union, intersection, Cartesian product, disjoint sets, complements, and universal sets.
- Understand the difference between distinguishable and indistinguishable dice.

Section 6.2

- Draw, read information from, and complete Venn Diagrams.
- Find the cardinality of sets including the complement of a set, the union, intersection, and Cartesian product of two sets. Know the formulas $n(A \cup B) = n(A) + n(B) - n(A \cap B)$ and $n(A') = n(S) - n(A)$.

Section 6.3

- Use the addition principle, multiplication principle, and decision algorithm to solve application problems.

Section 6.4

- Understand when to use n factorial in application problems.
- Solve application problems involving permutations and combinations.

Section 7.1

- Write the sample space for probability experiments and list the elements of a described event.
- Given a contingency table and defined events, be able to describe the union, intersection, and complement of the events in words and find the cardinality of those sets.
- Given sets described in words, be able to express the union, intersection and complement of those sets in symbols.

Section 7.2

- Find relative frequencies of an experiment.
- Apply the properties of relative frequency distributions.

Section 7.3

- Find theoretical probabilities in experiments in which all outcomes are equally likely by writing the sample space and counting the desired outcomes.
- Find probabilities of unions, intersections, and complements. Know the formulas $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ and $P(A') = P(S) - P(A)$.
- Carefully define events A and B and sample space S.

Section 7.4

- Find theoretical probabilities by applying the counting methods taught in sections 6.3 and 6.4 (Addition Principle, Multiplication Principle, Permutations, and Combinations).

Section 7.5

- Find the conditional probability of an event by using the formula $P(A|B) = \frac{P(A \cap B)}{P(B)} = \frac{n(A \cap B)}{n(B)}$
- Draw a tree diagram and apply the multiplication principle for conditional probabilities. $P(A \cap B) = P(A) \cdot P(B|A)$
- Apply the multiplication principle for independent events $P(A \cap B) = P(A) \cdot P(B)$
- Show whether two events are independent by showing whether $P(A \cap B) = P(A) \cdot P(B)$

Section 7.6

- Draw an appropriate tree diagram and use Bayes' Theorem to find probabilities. Bayes' Theorem: $P(A|T) = \frac{P(\text{using } A \text{ and } T \text{ branches})}{\text{Sum of } P(\text{using branches ending in } T)}$

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