

MATH U115 FINAL EXAM

22 JUNE 2004

1) Consider the system of equations

$$\begin{aligned}6x - 3y &= -7 \\5x + 4y &= 3.\end{aligned}$$

a) Express the system as a matrix equation.

b) Solve the system for x and y .

2) A survey of retirees in Arizona who golf or fish every day found that 60% of those who played golf one day switched to fishing the next and that 90% who went fishing switched to golf the next day.

a) Write the transition matrix describing this situation and label it.

b) Suppose that today 30% of the retirees are golfing. What fraction of the retirees will be fishing the day after tomorrow?

c) Give the stable distribution of golfing versus fishing.

3) A survey of the parents of 44 third-graders asked in what after-school activities each of their children participated. The three activities were soccer, music, and dance, abbreviated S, M, D , respectively. The numbers in each activity broke down as follows:

$$\begin{aligned}n(S) = n(M) = n(D) = 17, \quad n(M \cap S) = 7, \\n(M \cap D) = 6, \quad n(S \cap D) = 5, \quad n(S \cap M \cap D) = 2\end{aligned}$$

a) What is the probability that a child in the survey participates in soccer or dance?

b) What is the probability that a child in the survey takes music lessons?

c) What is the probability that a child in the survey takes music and dance, but not soccer?

4) How many different 5-letter code-words can be formed from the first 7 letters of the alphabet if adjacent letters in the code must differ?

5) Set up (**Do not solve!**) the following linear programming problem: A factory makes two products, A and B . Each A produced requires 2 and each B requires 3 labor-hours of assembly time. For testing, A requires 2 while B just 1 labor-hour. Each day there are 42 labor-hours available for assembly and 26 labor-hours for testing. If each A generates \$20 profit and each B , \$25 give the constraints and objective function.

6) Using the graph paper provided, sketch the feasible region described by the inequalities

$$2x + 3y \leq 12, \quad 3x + y \leq 12, \quad x \geq 1, \quad y \geq 0.$$

Then maximize $P(x, y) = 14x + 21y$ subject to the constraints they represent.

7) How many three-digit odd numbers can be formed, repetitions allowed, using the digits 1, 2, 3, 4, 5, 6, 7?

8) A group of five boys and four girls is to be photographed.

a) In how many ways can they be arranged all in a row?

b) In how many ways can they be arranged with the girls in a front row and the boys in a back row?

c) In how many ways can they be arranged so that they are all in a row and alternate boy/girl?

9) A jar has numbered balls in it, 8 of which are white, and 4 of which are black. You are allowed to draw four balls from the jar blind.

a) What is the probability of drawing all four black balls?

b) What is the probability they will come out in numerical order?