

Mat 183 Spring 2002 Final Exam

Name: _____
(please print)

Recitation Time: _____

Recitation Instructor : Osterrieder

Buzaianu

Instructions: Show all the work you want graded on this exam. Unsupported answers may receive little or no credit. List the values put into your calculator and the specific program being used.

Problem	Points	Score	
1	6		
2	6		
3	5		/ 17
4	5		
5	6		
6	8		/ 19
7	5		
8	5		
9	6		/ 16
Total	52		

Part I – Probability

1. (a) How many 5 letter words (including nonsense words) can be made from the letters L , A , T , S , K , E , and M if words must end with a vowel and letters cannot be repeated ?

- (b) E and F are events with $\Pr(E) = 0.3$, $\Pr(F) = 0.5$ and $\Pr(E \cup F) = 0.7$.
Are E and F independent ?

- **2.** A class has 10 students , 4 of whom are seniors . An experiment consists of Randomly selecting students one at a time without replacement, until either *three students have been chosen or a senior is chosen.*

(a) Draw a tree diagram to illustrate this experiment. Include probabilities along the branches.

(b) What is the probability that the experiment ends by getting a senior on the second selection ?

- 3.** An urn contains 6 red and 4 green balls. Three balls are drawn without replacement and the number of red balls is observed.

(a) Make a probability distribution table for the number of red balls drawn.

(b) What is the expected value for the number of red balls drawn ?

Part II – Statistics and Math of Finance

4. The weight of bowling balls produced by a factory is normally distributed with a mean of 15.1 pounds and a standard deviation of .7 pounds. Let X be a random variable whose possible values are the weights of the balls produced by the factory .

(a) Find $\Pr(12.2 \leq X \leq 17.3)$

(b) Find the weight which separates the bottom 6 % of the balls from the rest.

5. (a) If for 25 years you deposit \$ 100 at the end of each month into an account paying 5.4 % annually , what will your final balance be ?

(b) Suppose you borrow \$ 180,000 at 7 % interest compounded monthly to start a new business. Assume the loan is to be paid off in 15 years.

(1) What are your monthly payments ?

(2) What is the balance on your loan after 9 years ?

6. Consider the difference equation $y_n = -\frac{1}{3}y_{n-1} + 4$, $y_0 = 5$.

(a) Find the line $y = \frac{b}{1-a}$.

(b) Is its graph constant, monotone, or oscillating? Why?

(c) Is its graph attracted to or repelled by the line?

(d) Make a table displaying the values y_0 through y_5 . (Use TI-83)

Part III – Linear Algebra

7. Using the `rref` command find all solutions to the following system of equations.

$$\begin{cases} x + 2y - z = 3 \\ x - y + z = 4 \\ 2x + 4y - 2z = 6 \end{cases}$$

8. Pivot the following matrix about the indicated entry.

$$\begin{bmatrix} 3 & -1 & 2 & 5 \\ 1 & -4 & 6 & 2 \\ (2) & 1 & -1 & 9 \end{bmatrix}$$

9. The economy of Narnia consists of two industries, oil and steel. The oil industry consumes \$.06 of oil and \$.10 of steel to produce \$ 1 of oil. The steel industry consumes \$.20 of oil and \$.15 of steel to produce \$ 1 of steel.

(a) What is the Input-Output matrix for this economy ?

(b) At what level should each industry produce in order to have \$ 18 million of oil and \$ 23 million of steel available for export ?