UNIVERSITY OF JORDAN
CHEMICAL ENGINEERING DEPARTMENT

0905331 –PROCESS MODELING BY STATISTICAL METHODS

Name	
University ID	
Section	

Course	Process modeling by statistical methods (0905331)
Exam	Midterm
Date	Saturday, 10/12/2005
Time	60 minutes open book part
Instructor	Dr. Ali Al-matar

Problem	Full Mark	Mark
1	**25**	
2	**25**	
3	**25**	
4	**25**	
Total	**100**	

Question 1 (25 points)

Computers in a shipment of 100 units contain a portable hard drive, CD-RW drive, or both according to the following table

		Portable hard drive	
		YES	NO
CD-RW	YES	15	80
	NO	4	1

Let A denote the event that a computer has a portable hard drive and let B denote the event that a computer has a CD-RW drive. If one computer is selected randomly, compute:

a) P(A)

b) P(A∩B)

c) P(A∪B)

d) P(A'∩B)

e) P(A|B)

Question 2 (25 points)

Printed circuit cards are placed in a functional test after being populated with semiconductor chips. A lot contains 140 cards, and 20 are selected without replacement for functional testing:

    a) If 20 cards are defective, what is the probability that at least 1 defective card is in the sample?

    b) If 5 cards are defective, what is the probability that at least 1 defective card appears in the sample?

Question 3 (25 points)

The fill volume of an automated filling machine used for filling cans of carbonated beverage is normally distributed with a mean of 12.4 fluid ounces and a standard deviation of 0.1 fluid ounces.

a) What is the probability a fill volume is less than 12 fluid ounces?

b) If all cans less than 12.1 or greater than 12.6 ounces are scrapped, what proportion of cans is scrapped?

c) Determine specifications that are symmetric about the mean that include 99% of all cans.

Question 4 (25 points)

The following data are according to CNN.COM and as of November, 5. It breaks down the number of killed and wounded soldiers according to affiliation in the US military in Iraq. You may assume the total number of US occupation troops in Iraq is constant at 150,000 troops.

	% of Military (Estimate)	Killed	Wounded
Army	58	1,391	10,182
Navy	1	41	311
Marines	39	589	4,883
Air force	1.9	20	192
Coast guards	0.1	1	0

a) If a soldier were killed, what is the probability that he belongs to the Marines corps?
b) If a soldier were wounded, what is the probability that he belongs to the Marines corps?
c) If a soldier is either killed or wounded, what is the probability that he belongs to the Army, Navy, Marines, Air force and Coast guards?
d) Do you think your answers in the previous part suggest any disproportional casualties for certain divisions compared to their percentage in the military?