MATH 244 (L1)

Applied Statistics

Mid-Term Examination

October 29, 2001

(5 marks)

(5 marks)

Time allowed : 90 minutes Answer all questions.

1. (25 marks) The following histogram shows the distribution of the amounts of time (in seconds) of 10000 jobs processed by a large mainframe computer's central processing unit.



(a)	Is the distribution sy	vmmetric	positively	skewed	or negatively	v skewed?	(4 marks)
(a)	is the distribution sy	ymmeure,	positivery	SKeweu,	or negatively	SKeweu:	(T marks)

- (b) Construct the frequency distribution table for the CPU times. (6 marks)
- (c) Find the five number summary. (10 marks)
- (d) Sketch a box-plot for the CPU times.
- 2. (25 marks) In a flexible manufacturing system, let X be the number of machines available and Y be the number of sequential operations required to process a part. The joint distribution was tabulated below.

	Y					
X	0	1	2			
1	0	0.05	0.1			
2	0.15	0.1	0.15			
3	0.3	0.15	0			

- (a) Are *X* and *Y* independent? Why?
- (b) Find the correlation coefficient between X and Y. (12 marks)
- (c) Suppose it is known that there are at least two machines available. What (8 marks) is the probability that we need exactly one operation to process a part?

P. T. O.

- 3. (*10 marks*) Computer jobs submitted to a computer system at a rate of one per five minutes in accordance with a Poisson process. Find the probability that there will be at least three jobs submitted to the system from 3:00pm to 3:30pm.
- 4. (10 marks) A large freight elevator can transport a maximum of 10,000 pounds (5 tons). Suppose a load of cargo containing 45 boxes must be transported via the elevator. Experience has shown that the weight X of a box of this type of cargo follows a probability distribution with mean 200 pounds and standard deviation 55 pounds. What is the probability that all 45 boxes can be loaded onto the freight elevator and transported simultaneously?
- 5. (*30 marks*) Consider the following lotto game. You can pay \$10 for one ticket with chances for prizes of various amounts listed below. Assume that there is unlimited number of prizes.

Prize	Probability
\$2000	0.001
\$1000	0.002
\$250	0.004
\$100	0.01
\$50	0.03

- (a) A ticket with a prize is said to be a lucky ticket. If you buy one ticket, (4 marks) what is the probability that it is a lucky ticket?
- (b) Let X be the **net** amount you can win by one ticket. Find E(X) and ^(10 marks) Var(X).
- (c) If you buy one hundred tickets, what is the probability that you can only (5 marks) get less than five lucky tickets?
- (d) If you buy one hundred tickets, what is the probability that you will lose (8 marks) less than \$100?
- (e) What assumption did you made in the calculations in (c) & (d)? (3 marks)

< E N D >