

ECO 261-Fall 2009

Problem Set-2

**Due by September 29, Tuesday**

1) A corporation takes delivery of some new machinery that must be installed and checked before it becomes available to use. The corporation is sure that it will take no more than 7 days for this installation and check to take place. Let A be the event "It will be more than 4 days before the machinery becomes available" and B the event "It will be less than 6 days before the machinery becomes available."

- a) Describe the event that is complement of A.
- b) Describe the event that is the intersection of A and B.
- c) Describe the event that is the union of events A and B.
- d) Are the events A and B mutually exclusive.
- e) Show that  $(A \cap B) \cup (\bar{A} \cap B) = B$ .
- f) Show that  $A \cup (\bar{A} \cap B) = A \cup B$ .

2) a) The sample space contains 10 A's and 6 B's. What is the probability that a randomly selected sample set of 4 will include 2 A's and 2 B's?

b) The sample space contains 6 A's and 4 B's. What is the probability that a randomly selected sample set of 3 will include 1 A and 2 B's?

3) A corporation receives a particular part in shipments of 100. Research indicated the probabilities shown in the accompanying table for numbers of defective parts in a shipment.

Number of Defective	0	1	2	3	More than 3
Probability	0.29	0.36	0.22	0.10	0.03

- a) What is the probability that there will be less than 3 defective parts in a shipment?
- b) What is the probability that there will be more than 1 defective part in a shipment?
- c) The five probabilities in the table sum to 1. Why must this be so?

4) A department manager has monitored the number of complaints received per week about poor service. The probabilities for numbers of complaints in a week, established by this review, are shown in the following table. Let A be the event "There will be at least one complaint a week" and B be the event "There will be less than 10 complaints in a week"

Number of Complaints	0	1 to 3	4 to 6	7 to 9	10-12	More than 12
Probability	0.14	0.39	0.23	0.15	0.06	0.03

- a) Find the probability of A.
  - b) Find the probability of B.
  - c) Find the probability of complement of A.
  - d) Find the probability of the union of A and B.
  - e) Find the probability of the intersection of A and B.
  - f) Are A and B mutually exclusive?
- 5) a) The probability of A is 0.40 and the probability of B is 0.45 and the probability of either is 0.85. What is the probability of both A and B?
    - b) The probability of A is 0.60 and the probability of B is 0.45 and the probability of both is 0.30. What is the probability of either A and B?
    - c) The probability of A is 0.80 and the probability of B is 0.10 and the probability of both is 0.08. What is the conditional probability of A given B? Are A and B independent in a probability sense?
    - d) The probability of A is 0.30 and the probability of B is 0.40 and the probability of both is 0.30. What is the conditional probability of A given B. Are A and B independent in a probability sense?
  - 6) A student committee has six members -four undergraduate and two graduate students. A subcommittee of three members is to be chosen randomly so that each possible combination of three of the six students are equally likely to be selected. What is the probability that there will be no graduate students on the subcommittee?
  - 7) A music store owner finds that 30% of the customers entering the store ask for help and that 20% of the customers make a purchase before leaving. It is also found that 15% of all customers both ask for assistance and make a purchase. What is the probability that a customer does at least one of those things?