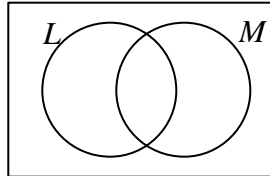


Business Mathematics I¹

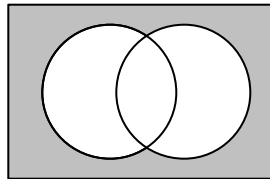
STUDY GUIDE FOR MIDTERM 1

The following questions explore parts of the material that will be covered on *Test 1*.

Consider a randomly selected new small business in your area. Let L be the event that it stays in business for the next 5 years, and let M be the event that it is located in a shopping Mall. Chamber of Commerce records yield the following estimates for probabilities. $P(L) = 0.20$, $P(M) = 0.40$, and the probability of either L or M is 0.50.



1. Label the regions which represent the following events. (i) L and M . (ii) M but not L . (iii) $L \cap M^C$.
2. Compute the following. (i) $P(L \text{ and } M)$. (ii) $P(L^C \cap M^C)$. (iii) The probability that neither L nor M happens. (iv) $P(M^C \cup L)$. (v) $P(M|L)$. (vi) $P(L|M)$.
3. Describe the shaded region (i) in words, and (ii) in set symbols.



4. (i) Are L and M independent? (ii) Are L and M mutually exclusive?
5. What is the real-world interpretation of the statement that, " $P(L) = 0.2$?"
6. If $P(L)$ and $P(L|M)$ are different, explain in real-world terms what that difference tells you about small businesses.

A spinner stops at numbers 1, 2, or 3 with the probabilities 0.5, 0.3, and 0.2; respectively. You are to make two independent spins and record the numbers. Let X be the random variable which gives the sum of the numbers obtained on the two spins.

7. Set up a sample space, S , for this experiment, and assign realistic probabilities to each of the 9 outcomes.

8. Compute the following. (i) $P(2 < X \leq 5)$. (ii) $P(X = 6)$ (iii) $E(X)$. (iv) $\sum_{x=2}^4 x^2 \cdot P(X = x)$

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9. What is the real-world interpretation of the number $E(X)$?

The following problems refer to the data in only the first 20 loan records in the file *Loan Records*.

Bank Information		Borrower			Result
Customer Number	Former Bank	Years In Business	Education Level	State Of Economy	Loan Paid Back?
1	Cajun		Bachelor's Degree		no
2	BR	11			no
3	BR	13			yes
4	Cajun		Graduate Degree		no
5	DuPont			Normal	no
6	BR	20			no
7	BR	1			yes
8	DuPont			Boom	no
9	BR	7			no
10	BR	12			yes
11	DuPont			Normal	no
12	Cajun		Bachelor's Degree		no
13	BR	7			no
14	DuPont			Normal	yes
15	BR	16			yes
16	BR	18			yes
17	Cajun		Graduate Degree		yes
18	DuPont			Boom	no
19	DuPont			Recession	yes
20	BR	8			yes

10. Use this data to estimate the following. (i) $P(S)$. (ii) $P(S_{DP}|C_{DP})$. (iii) $P(C_{DP}|S_{DP})$.