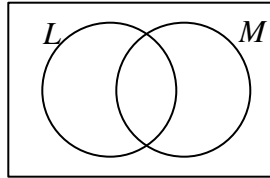


# Business Mathematics I<sup>1</sup>

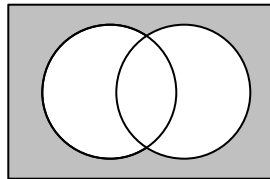
## STUDY GUIDE FOR MIDTERM 1

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)  $P(C_{DP}|S_{DP})$ .