

## Math 125-001 Individual Assignment

Chapter	Topic	Exercises	Pages	Total Points
1	1.2	2 a b	29	2
	1.3	1 c	34	1
2	2.1	1 b d e	42	3
	2.2	1 b c	49	2
	2.3	3 b d e	56	3
	2.4	2 b	63	1
	2.5	1 c d e f	68	4
3	3.1	1 b d e	78	3
	3.2	3	86	1
	3.3	3 a b d	95	3
4	4.1	2 b c	104	2
	4.2	2 a b c	112	3
	4.3	1 d	123	1
	4.4	2 a b	133	2
5	5.1	1 d e f	156	3
	5.2	1 b c d	167	3
	5.3	23 a	175	1
	5.4	1 b	181	1
6	6.1	3 a b c d e	191	5
	6.2	2 a b	198	2
	6.3	9 a b	203	2
7	7.1	2	209	1
	7.2	2 a	215	1
	7.3	2 a b c d e	222	5
	7.4	2 b c e	230	3
	7.5	2 a b	235	2
	7.6	2	239	1
	7.7	2	244	1
8	8.2	19 a c d f	265	4
	8.3	2 a	275	1
	8.4	2 a b c	279	3
9	9.2	4 a	294	1
	9.3	6	300	1
10	10.1	17	310	1
	10.2	3 c d	317	2
	10.3	2	325	1
	10.4	3	333	1
11	11.1	1 b c d e f	343	5
	11.2	2	350	1
	11.4	1 b	360	1
	11.5	10	365	1

12	12.1	10 a	378	1
	12.2	7 b	383	1
	12.3	7	391	1
	12.4	4 a	396	1
	12.5	1 c d	402	2
	12.6	3 b	408	1
13	13.1	4	417	1
	13.2	4	425	1
14	14.1	2 a c	443	2
	14.2	1 b	449	1
	14.3	5 b	454	1
	14.4	6 b c	458	2

### Extra Credit Problem

A certain magician during his show offers a game to volunteers from the audience. In this game, every participant can win a free ticket to Hawaii, and alternatively agrees to take a goat home. Presumably, a free ticket to Hawaii is desirable to everybody in the audience, and everybody would hate taking a goat home. The game is played as a sequence of trials taken by one participant-volunteer; other volunteers should wait until the game is over. The final outcome for a participant is determined by averaging individual trial results.

The magician prepared the following setup for this show. On the stage, there are three doorways closed by curtains. Behind one of the curtains is the ticket to Hawaii on a small table. Behind the other two curtains are goats. The location of the ticket is randomly altered at the beginning of every trial by the magician's assistant who works behind the scene. Every time the magician knows precisely where the ticket is, and the location of the ticket is not changed during a trial. The procedure for each trial is the following.

*Step 0:* the ticket and the two goats are randomly allocated behind the three curtains.

*Step 1:* the participant-volunteer selects one of the three curtains by pointing to it (the selected curtain remains closed at this time).

*Step 2:* the magician opens one of the two curtains that were not selected by the participant. If the ticket is behind the curtain opened by the magician, then the trial restarts from Step 0; otherwise, the trial continues with Step 3.

*Step 3:* the participant has to make the final choice for the trial. The options are (i) to stay with the original selection, or (ii) to switch to the last remaining curtain.

*Step 4:* the magician opens the curtain selected by the participant at Step 3. If the ticket is behind that curtain, then the participant wins the trial. If, on the contrary, a goat is behind that curtain, then the participant loses the trial.

Sean and Dave volunteered to play the game during the show. At Step 3, Dave always stayed with the choice that he made at Step 1, while Sean always switched. The two goats used in this show were taken home by Sean and by Dave. The magician kept the ticket.

**Questions:**

- (a) What strategies were likely used by the magician when he played against Sean and Dave? You may use the hint below.

Suppose that on the next day you volunteered to play this game against the magician.

- (b) What are your chances to win a trial, given that the magician showed you a goat at Step 2, and you switched your choice at Step 3? Give a number and explain.

- (c) What would be the answer to (b), if the magician did not know where the ticket was (still, assuming that both you and the magician follow the procedure)?

Suppose you are the magician, and your friend will volunteer during the show tomorrow.

- (d) What strategy should you and your friend agree to use in order to *guarantee* that your friend wins? The friend will not know the ticket location a priori.

- (e) What would be the answer to (d), if the goal was for your friend to lose?

*Hint (which is not necessary for you to solve the problem):* somebody told you that the magician may use the following two strategies. Strategy 1: always show a goat at Step 2. Strategy 2: if possible, show a ticket at Step 2, otherwise show a goat.