This Review is comprehensive but should not be the only material used to study for the Final Exam. It should not be considered a preview of the Final Exam. Studying your previous tests, quizzes, homework, class notes, text discussions, etc. will prepare you to do well on the Final Exam. There may be questions on the Final Exam that are unlike questions on this Review, and vice versa. No question on this Review will be duplicated exactly on the Final Exam. This Review is much longer than the Final Exam. You may obtain help working on this Review in the Math Lab located in 925-N.

1. Construct a Venn diagram to determine the validity of each given argument.

    (a)   1. All master photographers are artists.
          2. Ansel Adams is a master photographer.
          Therefore, Ansel Adams is an artist.

    (b)   1. All master photographers are artists.
          2. Ansel Adams is an artist.
          Therefore, Ansel Adams is master photographer.

    (c)   1. All poets are loners.
          2. All loners are taxi drivers.
          Therefore, all poets are taxi drivers.

2. Fill in the blank with what is most likely to be the next number.

    (a) 3, 5, 7, 11, 13, _____
    (b) 3, 7, 11, 15, _____

3. Fill in the blanks with what are most likely to be the next letters.

    O, T, T, F,

4. Using the symbolic representations given below, express the following compound statements in symbolic form.
          p: The lyrics are controversial.
          q: The performance is banned.

    (a) The lyrics are controversial, and the performance is banned.
    (b) If the lyrics are not controversial, the performance is not banned.
    (c)   It is not the case that the lyrics are controversial or the performance is banned.
    (d) The lyrics are controversial and the performance is not banned.
    (e) Having controversial lyrics is sufficient for banning a performance.
    (f) Noncontroversial lyrics are necessary for not banning a performance.

5. Using the symbolic representations given below, express the following compound statements in symbolic form.

          p: A person plays the guitar.
          q: A person rides a motorcycle.
          r: A person wears a leather jacket.

    (a) If a person plays the guitar or rides a motorcycle, then the person wears a leather jacket.

    (b) A person plays the guitar, rides a motorcycle, and wears a leather jacket.

    (c) A person wears a leather jacket and doesn't play the guitar or ride a motorcycle.
    (d) All motorcycle riders wear leather jackets.

    (e) Not wearing a leather jacket is sufficient for not playing the guitar or riding a motorcycle.

    (f) Riding a motorcycle or playing the guitar is necessary for wearing a leather jacket.

6. Consider the symbolic representations given below.
   p: A person is born in the United States.

   q: A person is an American citizen.

   Translate the following sentence into symbolic form.
   All people born in the United States are American citizens.

7. Consider the symbolic representations given below.
   p: A person is a convicted felon.

   q: A person is eligible to vote.
   Translate the following sentence into symbolic form.
   No convicted felon is eligible to vote.

8. Construct a truth table for the symbolic expression.

   ~*q* → ~*p*

p	*q*	~*q*	~*p*	~*q* → ~*p*
T	T			
T	F			
F	T			
F	F			

9. Construct a truth table for the symbolic expression.

   p ∧ ~(*q* ∨ *r*)

p	*q*	*r*	*q* ∨ *r*	~(*q* ∨ *r*)	*p* ∧ ~(*q* ∨ *r*)
T	T	T			
T	T	F			
T	F	T			
T	F	F			
F	T	T			
F	T	F			
F	F	T			
F	F	F			

10. Translate the two statements into symbolic form and use truth tables to determine whether the statements are equivalent or not equivalent.
    (a) I cannot have surgery if I do not have health insurance.
        If I can have surgery, then I do have health insurance.
    (b) If I am illiterate, I cannot fill out an application form.
        I can fill out an application form if I am not illiterate.

11. The universal set is U = {0, 1, 2, 3, 4, 5, 6, 7, 8, 9}.

   If A = {1, 2, 3, 4, 5} and B = {4, 5, 6, 7, 8}, find the following sets.

   (a) $A \cap B$
   (b) $A \cup B$
   (c) A'
   (d) B'

**12.** The universal set is U = {Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday}. If A = {Monday, Tuesday, Wednesday, Thursday, Friday} and B = {Friday, Saturday, Sunday}, find the indicated set.

$$A \cup B$$

13. The universal set is U = {Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday}. If A = {Tuesday, Wednesday, Thursday, Friday, Saturday} and B = {Friday, Saturday, Sunday}, find the indicated set

$$A'$$

14. The universal set is U = {Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday}. If A = {Tuesday, Wednesday, Thursday, Friday, Saturday} and B = {Friday, Saturday, Sunday}, find the indicated set.

$$A' \cup B$$

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15. In a recent transportation survey, 500 high school seniors were asked to check the appropriate box or boxes on the following form.

☐ I own an automobile.
☐ I own a motorcycle.

The results were tabulated as follows: 105 students checked the automobile box, 145 checked the motorcycle box, and 23 checked both boxes. In the following Venn diagram, Region A represents students owning automobiles and Region M represents students owning motorcycles. Determine each value on the Venn diagram, and the percent of students who own an automobile or a motorcycle. (Round your answer to one decimal place.)
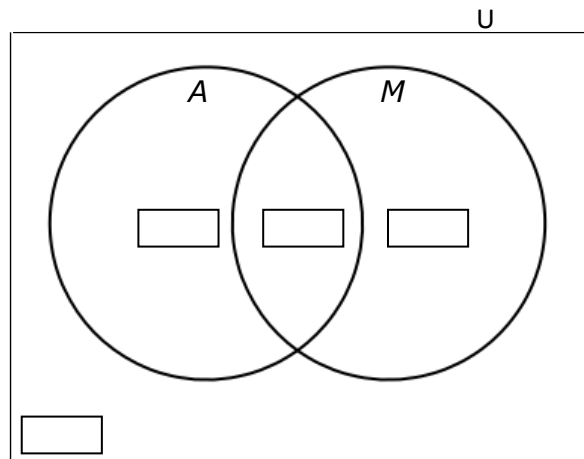
16. In a recent health survey, 700 single men in their twenties were asked to check the appropriate box or boxes on the following form.

☐   I am a member of a private gym.
☐   I am a vegetarian.

The results were tabulated as follows: 348 men checked the gym box, 108 checked the vegetarian box, and 312 were blank (no boxes were checked).In the following Venn diagram, Region G represents single men who are members of a private gym and Region V represents single men who are vegetarians. Determine each value on the Venn diagram, and the percent of the men who were both members of a private gym and vegetarians. (Round your answer to one decimal place.)

U

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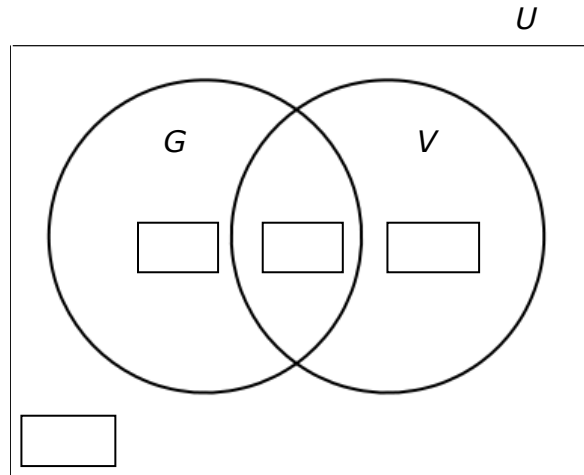
17. A survey of 200 people yielded the following information: 92 people owned a DVD player, 123 owned a microwave oven, and 78 owned both. How many people owned the following?

   (a) a DVD player or a microwave oven
   (b) a DVD player but not a microwave oven
   (c) a microwave oven but not a DVD player
   (d) neither a DVD player nor a microwave oven

18. A department store surveyed 428 shoppers, and the following information was obtained: 214 shoppers made a purchase, and 295 were satisfied with the service they received. If 53 of those who made a purchase were not satisfied with the service, how many shoppers did the following?

   (a) made a purchase and were satisfied with the service
   (b) made a purchase or were satisfied with the service
   (c) were satisfied with the service but did not make a purchase
   (d) were not satisfied and did not make a purchase

19. A certain model of automobile is available in seven exterior colors, four interior colors, and four interior styles. In addition, the transmission can be either manual or automatic, and the engine can have either four or six cylinders. How many different versions of the automobile can be ordered?

20. A sporting goods store has fourteen lines of snow skis, six types of bindings, eight types of boots, and two types of poles. Assuming that all items are compatible with each other, how many different complete ski equipment packages are available?

21. Find the indicated values.
    (a) $_{10}P_5$
    (b) $_{10}C_5$

22. An art class consists of twelve students. All of them must present their portfolios and explain their work to the instructor and their classmates at the end of the semester.
    (a) If their names are drawn from a hat to determine who goes first, second, and so on, how many presentation orders are possible?
    (b) If their names are put in alphabetical order to determine who goes first, second, and so on, how many presentations orders are possible?

23. A softball league has thirteen teams. If every team must play every other team once in the first round of league play, how many games must be scheduled?

24. A jar on your desk contains eleven black, six red, thirteen yellow, and five green jellybeans. You pick a jellybean without looking. Find the probability that it is red or yellow.
    (a) Write the probability as a reduced fraction.
    (b) Write the probability as a percent, rounded to the nearest 1%.

25. One card is drawn from a well-shuffled deck of fifty-two cards (no jokers).
    (a) Find the probability of drawing a 4 of clubs. (State your answer as a fraction.)
    (b) Find the odds of drawing a 4 of clubs.
    (c) Use the Law of Large Numbers to interpret both the probability and the odds of drawing a 4 of clubs.
        (A) We should expect to draw a 4 of clubs about five times out of every fifty-two attempts. Also, we should expect to draw a 4 of clubs five times for every forty-eight times we do not draw a 4 of clubs.
        (B) We should expect to draw a 4 of clubs about one time out of every fifty-two attempts. Also, we should expect to draw a 4 of clubs one time for every fifty-one times we do not draw a 4 of clubs.
        (C) We should expect to draw a 4 of clubs the majority of the time.
        (D) We should expect to draw a 4 of clubs about nine times out of every fifty-two attempts. Also, we should expect to draw a 4 of clubs nine times for every forty-three times we do not draw a 4 of clubs.
        (E) We should not expect to draw a 4 of clubs as it is impossible.

26. A card is dealt from a complete deck of fifty-two playing cards (no jokers). Use probability rules (when appropriate) to find the probability that the card is as stated. (State your answer as fractions.)
    (a) a jack and a club
    (b) a jack or a club
    (c) not a jack of clubs

27. Find the probability that the sum is as stated when a pair of dice is rolled. (State your answer as fractions.)
    (a) 2
    (b) 5
    (c) 6

28. Ink Inc., a publishing firm, offers its 879 employees a cafeteria approach to benefits, in which employees can enroll in the benefit plan of their choice. Seven hundred sixteen employees have health insurance, 525 have dental insurance, and 481 have both health and dental insurance. (State your answer as fractions.)
    (a) What is the probability that one of the employees has either health or dental insurance?
    (b) What is the probability that one of the employees has health insurance but not dental insurance?

29. To study the spending habits of shoppers in Orlando, Florida, fifty randomly selected shoppers at a mall were surveyed to determine the number of credit cards they carried. The following results were obtained.

6 6 2 6 1 0 1 3 0 2 5 1 4 1
0 0 4 2 4 5 3 3 2 0 5 0 6 3
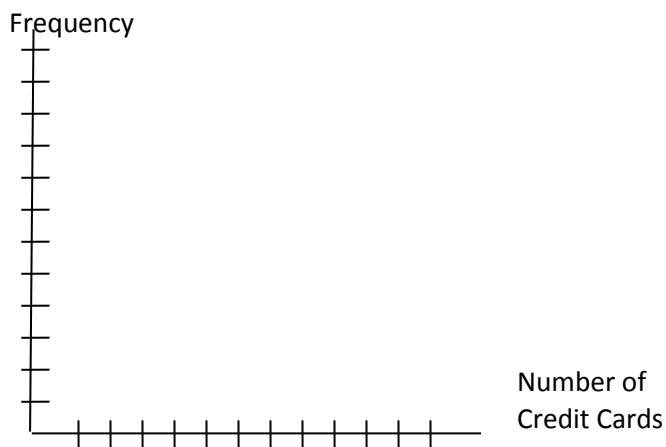6 1 4 1 4 0 1 0 3 5 5 5 2 2
4 2 3 3 2 4 5 0

(a) Organize the given data by creating a frequency distribution.

Number of Credit Cards	Frequency
0	
1	
2	
3	
4	
5	
6	

(b) Construct a pie chart to represent the data.
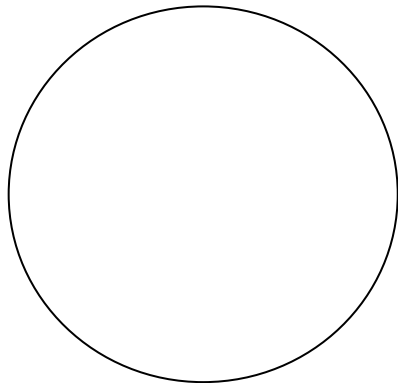
(c) Construct a histogram using single-valued classes of data.

Frequency

Number of
Credit Cards

30. Find the mean, median, and mode of the given set of raw data.

<div align="center">

20 25 18 30 21 25 34 27

34 35 19 26 38 31 20 23

</div>

31. Find the mean, median, and mode of each set of data
   (a)   12 16 20 24 28 32
   (b)   600 800 1,000 1,200 1,400 1,600
   (c) How are the data in part (b) related to the data in part (a)?
      (A) The data in part (b) are 50 times the data in part
      (B) The data in part (b) are 60 times the data in part
      (C) The data in part (b) are 25 times the data in part
      (D) The data in part (b) are the same as the data in part
      (E) The data in part (b) are 100 times the data in part (a).

   (d) How do your answers for parts (a) and (b) compare?
      (A) The mean and median in part (b) are 40 times the mean and median in part (a). Neither data set had a mode.
      (B) The mean and median in part (b) are 50 times the mean and median in part (a). Neither data set had a mode.
      (C) The mean in part (b) is 50 times the mean in part (a). Neither data set had a mode.
      (D) The mean, median and mode in part (b) are 50 times the mean, median and mode in part (a).
      (E) The mean and mode in part (b) are 60 times the mean and mode in part (a). Neither data set had a median.

32. Find the Sample Variance and Standard Deviation given the following sample data.
   (Round your answers to one decimal place.)

   5 10 7 5 12 3

   (a) Sample Variance
   (b) Standard Deviation

33. Find the mean and sample standard deviation of each set of data.
   (Round the standard deviation to two decimal places.)
   (a) 2 4 6 8 10 12
   (b) 102 104 106 108 110 112
   (c) How are the data in (b) related to the data in (a)?
      (A) The data in (a) are 100 more than the data in (b).
      (B) The data in (b) are the same as the data in (a).
      (C) The data are not related.
      (D) The data in (b) are 100 times the data in (a).
      (E) The data in (b) are 100 more than the data in (a).

   (d) How do your answers for (a) and (b) compare?
      (A) Both answers for (a) are the same as the answers for (b).
      (B) The mean of the data in (a) is 100 more than the mean of the data in (b). The standard deviations are the same.
      (C) The mean of the data in (b) is 100 more than the mean of the data in (a). The standard deviations are the same.
      (D) The answers are not related.
      (E) The means are the same. The standard deviation of the data in (b) is 100 more than the standard deviation of the data in (a).

34. Find the simple interest *I* of the given loan amount. (Round your answer to the nearest cent.)

    $2,000 borrowed at 7% for three years

35. Find the future value *FV* of the given present value. (Round your answer to the nearest cent.)

    Present value of $3,640 at $2\frac{3}{4}\%$ for six years

36. Find the future value *FV* of the given present value. (Round your answer to the nearest cent.)

    Present value of $12,490 at $5\frac{7}{8}\%$ for 670 days

37. Find the present value *PV* of the given future value. (Round your answer to the nearest cent.)

    Future value $8,800 at $9\frac{1}{2}\%$ simple interest for six years

38. Consider the following investment. (Round your answers to the nearest cent.)

    Find the future value of $2,000 at 6% compounded annually after 12 years

39. Find the future value of the given investment. (Round your answers to the nearest cent.)

    $5,400 at $6\frac{3}{4}\%$ compounded quarterly for $9\frac{1}{2}$ years

49. Find the present value that will generate the given future value. (Round your answers to the nearest cent.)

    $3,000 at 8% compounded annually for 9 years

41. Find the present value that will generate the give future value. (Round your answers to the nearest cent.)

    $4,449 at $10\frac{3}{4}\%$ compounded quarterly for 4 years

42. Find the future value of the given annuity. (Round your answer to the nearest cent.)

    ordinary annuity, $115 monthly payment, $6\frac{3}{4}\%$ interest, one year

43. The managers of Prints Alive (a local silk-screening business) are planning a party for their 30 employees. There are three possible locations for the party: the warehouse (W), the park (P), or the beach (B). The employees are asked to rank these choices in order of preference, and the results are summarized in the table. (Round your percent answers to the nearest whole number.)

Number of Ballots Cast			
5	7	11	7
1st choice P	P	B	W
2nd choice B	W	W	B
3rd choice W	B	P	P

(a) How many votes were cast?
(b) Use the plurality method of voting to determine the winner.
(c) What percent of the votes did the winner in part (b) receive?
(d) Use the instant runoff method to determine the winner.
(e) What percent of the votes did the winner in part (d) receive?

44. Four candidates, Harrison (H), Lennon (L), McCartney (M), and Starr (S), are running for regional manager. After the polls close, ranked ballots are tallied, and the results are summarized in the table. (Round your percent answers to the nearest whole number.)

	Number of Ballots Cast						
	29	96	48	81	33	17	24
1st choice	H	L	L	M	M	S	S
2nd choice	L	M	S	L	L	H	M
3rd choice	S	H	M	H	S	L	H
4th choice	M	S	H	S	H	M	L

(a) How many votes were cast?
(b) Use the plurality method of voting to determine the winner.
(c) What percent of the votes did the winner in part (b) receive?
(d) Use the instant runoff method to determine the winner.
(e) What percent of the votes did the winner in part (d) receive?

45. Determine the number of vertices, edges, and loops in the given graphs.

(a)

(b)
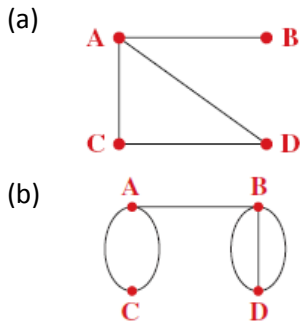
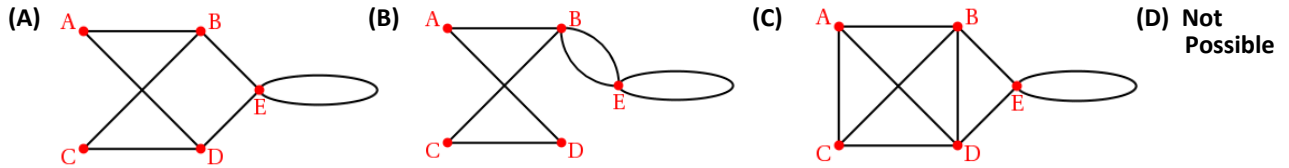46 Consider the following graphs.
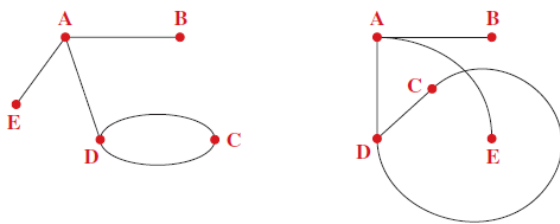
(a) Why do the two diagrams represent the same graph
   (A) They are both graphs with 5 edges and 5 vertices.
   (B) They are both graphs with 3 edges.
   (C) They are both graphs with 4 edges, 1 of which is a loop.
   (D) The edges of both graphs connect to the same points.
   (E) They are both graphs with 1 loop.

(b) Select another representation of the same graph that looks significantly different from either of these.

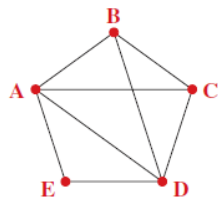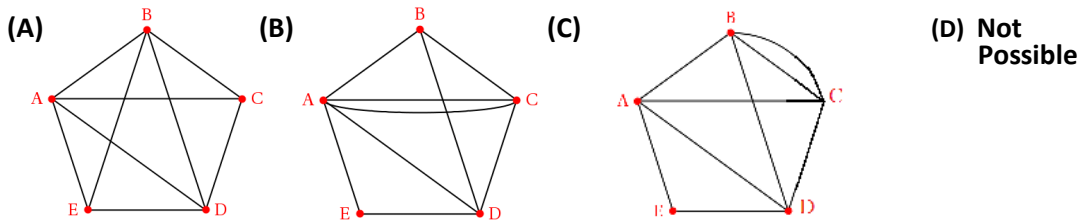**(A)** **(B)**   **(C)**   **(D)**
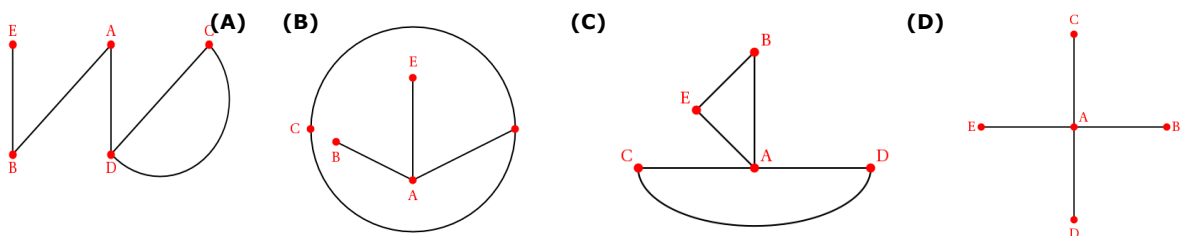
47. Given the following graph,
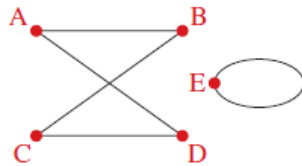
(a) Use Euler's Theorems to determine whether the graph has an Euler trail, an Euler circuit, or neither.
(b) Eulerize the graph, if possible.

(A) **(B)** **(C)** **(D) Not Possible**

48. Given the following graph,

(a) Use Euler's Theorems to determine whether the graph has an Euler trail, an Euler circuit, or neither.
(b) Eulerize the graph, if possible.

(A) **(B)** **(C)** **(D) Not Possible**

49. Use the flight costs shown in the figure below.

		From:						
		ATL	BOS	DEN	PHX	PORT	SFO	WASH
	ATL		$104	$144	$357	$467	$154	$74
	BOS	$104		$312	$446	$179	$134	$54
To:	DEN	$144	$310		$156	$122	$192	$175
	PHX	$447	$444	$156		$104	$136	$182
	PORT	$216	$177	$122	$104		$84	$492
	SFO	$154	$132	$192	$136	$84		$124
	WASH	$74	$52	$175	$182	$492	$144	

You live in Atlanta, and you need to visit Boston, Denver, and Phoenix.
(a) How many different circuits does your graph have?
(b) Approximate the cheapest route, using the nearest neighbor algorithm.
(c) Draw the cheapest route's graph using the nearest neighbor algorithm.
(d) Approximate the cheapest route, using the repetitive nearest neighbor algorithm.
(e) Draw the cheapest route's graph using the repetitive nearest neighbor algorithm.
(f) Approximate the cheapest route, using the cheapest edge algorithm.
(g) Draw this route's graph using the cheapest edge algorithm.

## Answer Key – MATH 1310 Departmental Final Exam Review

1. (a) valid, (b) invalid, (c) valid

2. (a) 17, (b) 19

3. F, S

4. (a) $p \wedge$, (b) $\sim p \rightarrow \sim q$, (c) $\sim(p \vee q)$, (d) $p \wedge \sim q$, (e) $p \rightarrow q$ (f) $\sim q \rightarrow \sim p$

5. (a) $(p \vee q) \rightarrow r$, (b) $p \wedge q \wedge r$, (c) $r \wedge \sim(p \vee q)$, (d) $q \rightarrow r$, (e) $\sim r \rightarrow \sim(p \vee q)$, (f) $r \rightarrow (q \vee p)$

6. $p \rightarrow q$

7. $p \rightarrow \sim q$

8.

p	q	$\sim q$	$\sim p$	$\sim q \rightarrow \sim p$
T	T	F	F	T
T	F	T	F	F
F	T	F	T	T
F	F	T	T	T

9.

p	q	r	$q \vee r$	$\sim(q \vee r)$	$p \wedge \sim(q \vee r)$
T	T	T	T	F	F
T	T	F	T	F	F
T	F	T	T	F	F
T	F	F	F	T	T
F	T	T	T	F	F
F	T	F	T	F	F
F	F	T	T	F	F
F	F	F	F	T	F

10. (a) equivalent, (b) not equivalent.

11. (a) { 4, 5}, (b) {1, 2, 3, 4, 5, 6, 7, 8}, (c) {0, 6, 7, 8, 9}, (d) {0, 1, 2, 3, 9}

12. {Friday, Monday, Saturday, Sunday, Thursday, Tuesday, Wednesday}

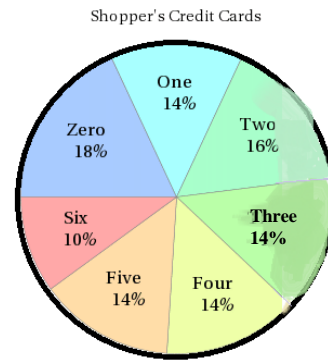13. {Monday, Sunday}
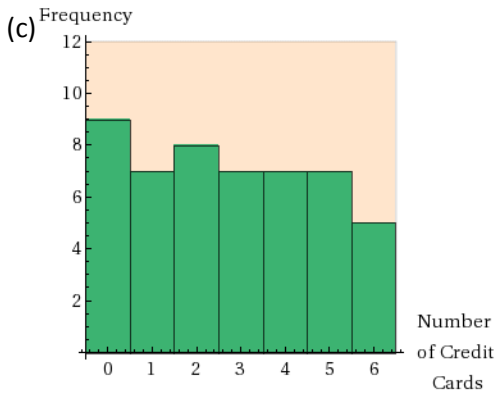
14. {Friday, Monday, Saturday, Sunday}

15.

, 45.4%
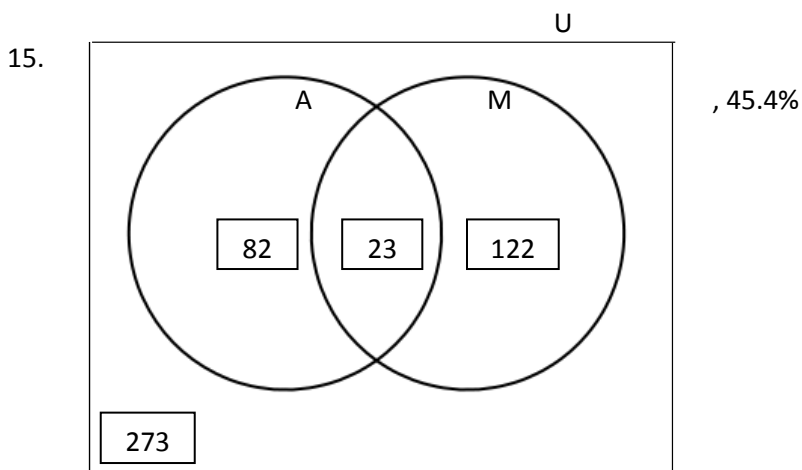
16.

, 9.7%
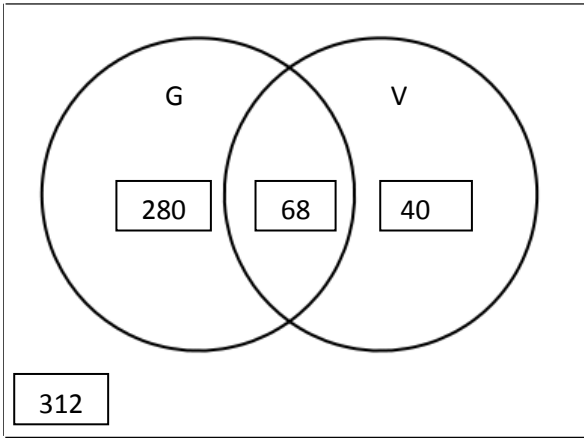
17. (a) 137, (b) 14, (c) 45, (d) 63

18. (a) 161, (b) 348, (c) 134, (d) 80

19. 448

20. 1344

21. (a) 30,240, (b) 252

22. (a) 479,001,600, (b) 1

23. 78

24. (a) 19/35, (b) 54   %

25. (a) 1/52, (b) 1:51, (c) B

26. (a) 1/52, (b) 4/13, (c) 51/52

27. (a) 1/36, (b) 1/9, (c) 5/36

28. (a) 760/879, (b) 235/879

29. (a)

Number of Credit Cards	Frequency	
0	9	
1	7	
2	8	
3	7	
4	7	
5	7	
6	5	

(b)

(c)

30. Mean: 26.625, Median: 25.5, Mode: 20, 25, 34
31. (a) Mean: 22, Median: 22, Mode: Does Not Exist, (b) Mean: 1100, Median: 1100, Mode: Does Not Exist
    (c) A, (d) B
32. (a) 11.6, (b) 3.4
33. (a) Mean: 7 Standard Deviation: 3.74, (b) Mean: 107, Standard Deviation: 3.74, (c) E, (d) C
34. I = $ 420.00
35. FV = $ 4240.60
36. FV = $ 13,836.95
37. PV = $ 5605.10
38. FV = $ 4,024.39
39. FV = $ 10,199.09
40. PV = $ 1500.75
41. PV = $ 2,910.59
42. FV = $ 1423.50
43. (a) 30 votes, (b) the park, (c) 40 %, (d) the beach, (e) 60 %
44. (a) 328 votes, (b) Lennon, (c) 44 %, (d) Lennon, (e) 53 %
45. (a) Vertices: 4, Edges: 4, Loops: 0 , (b) Vertices: 4, Edges: 6, Loops: 0
46. (a) D, (b) B
47. (a) Neither, (b) D
48. (a) Euler Trail, (b) C
49. (a) 6, (b) $ 927, (c) ATL → BOS → DEN → PHX → ATL, (d) $ 848, (e) ATL → BOS → PHX → DEN → ATL
    (f) $ 848, (g) ATL → BOS → PHX → DEN → ATL