1.

a) Inductive

b) Inductive

c) Deductive

d) Deductive

2.

a) {March, May}

b) {12,16,20,24}

3.

a) {p,r,t,v,z}

b) {s,y}

c) {z}

d) {x}

e) {z}

f) 1

g) {q,u,w,x,z}

h) Ø

i) {(p,p),(p,s),(p,v),(p,y),(s,p),(s,s),(s,v),(s,y),(v,p),(v,s),(v,v),(v,y),(y,p),(y,s),(y,v),(y,y)}

4.

a) FALSE. You can't determine how good is good. It is a not well defined set.

b) TRUE. Repetition does not add new elements.

c) TRUE. They are equivalent because they share the same number of elements. In this case they are also equal because both sets contain the same elements.

d) FALSE. They contain different ordered pairs.

e) FALSE; because 5 "is an element of" $\in$ the set.

f) FALSE. 8 $\notin$ "is not an element of" A.

g) FALSE. The empty set Ø contains no elements.

h) TRUE. B $\subseteq$ "is a subset of" U. In this case B is also a $\subset$ "proper subset of" U.

i) FALSE. A is neither a proper subset nor a set of B. A does not belong to B. A $\not\subset$ "is not a subset of" B.

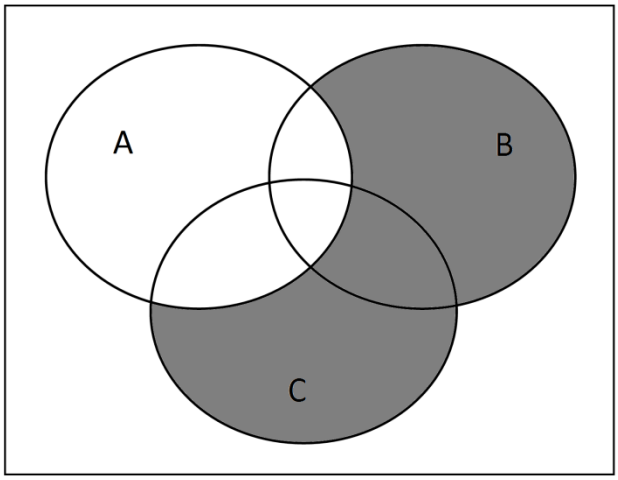
j) TRUE. The Ø empty set belongs to any set, so in this case it $\subseteq$ "is a subset of" C.

k) FALSE. B can't be a proper subset of itself.

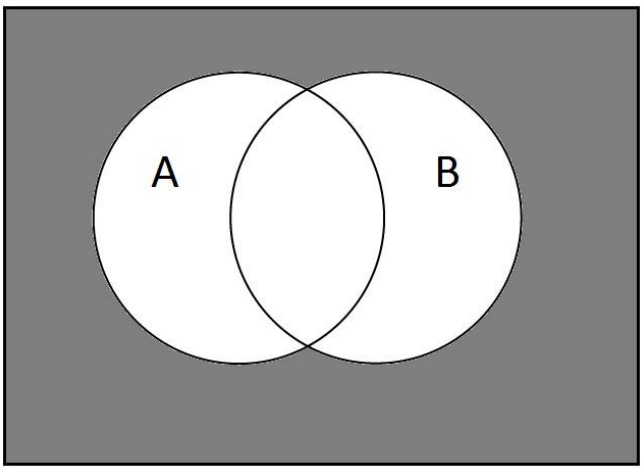
l) FALSE. There is also the Ø empty set. The subsets of D are {D} and {Ø}.

5.

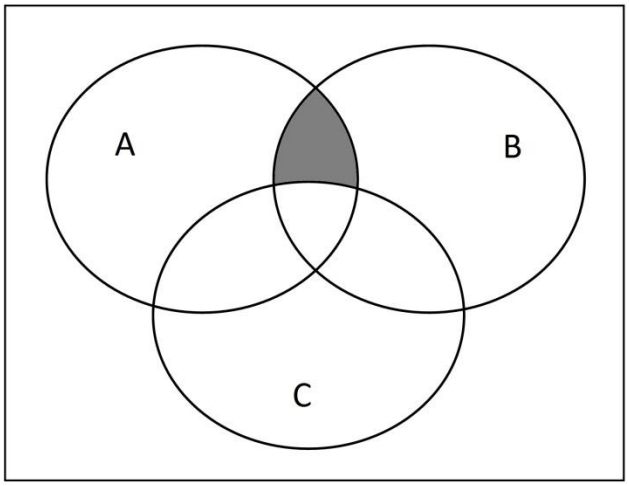
a)



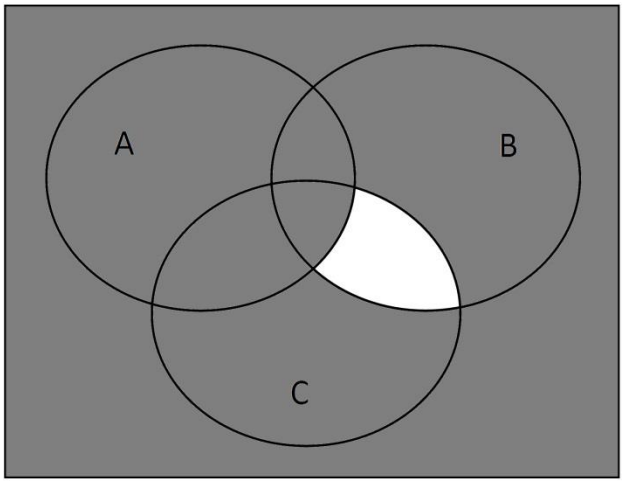
b)



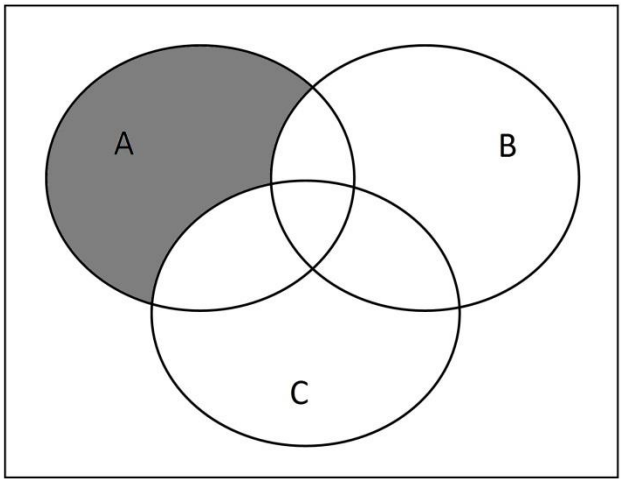
c)



d)



e)



6.

a) 810

b) 29,735

7.

a) 1011110_{two}

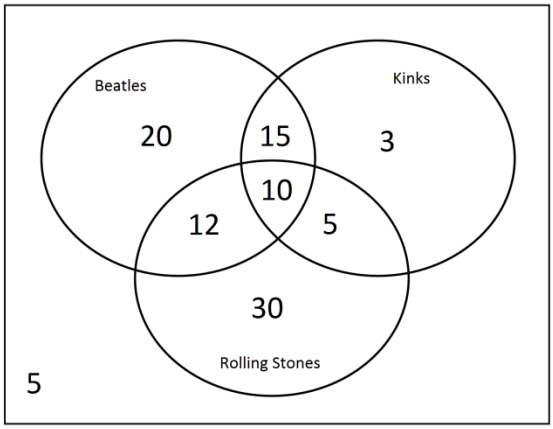
b) $1C4F_{sixteen}$

8.

a) 2131_{eight}

b) $E1BE1_{sixteen}$

9.



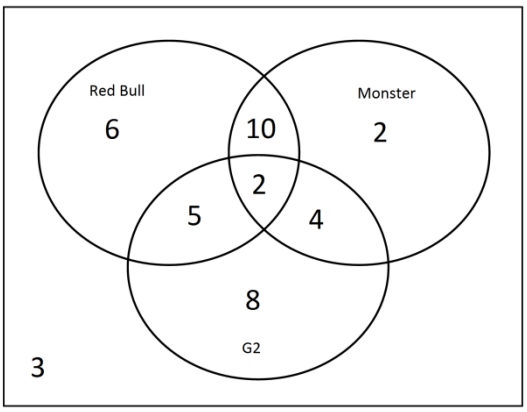
a) 32

b) 30

c) 5

d) 53

10.



a) 19

b) 18

c) 16

d) 17

e) 3

11.

a) 26, 42

b) 25, 32

12. There are many correct answers. For example: 20+20+20=60, where 60 is a two digit number.

13.

a) Statement (Declarative Sentence)

b) Not a statement (Command)

c) Not a statement (Question)

14.

a) I go to the library and I will not study.

The negation of $p \longrightarrow q$ is $p \wedge \sim q$

Apply De Morgan's Laws for b) and c)

b) You don't study and you pass your class.

c) I don't need to save money or I don't buy a nice car.

15.

a) $s \wedge \sim c$

b) $s \longrightarrow (c \wedge d)$

c) $c \longrightarrow (d \vee c)$

d) $c \leftrightarrow s$

16.

$\sim(F \vee T) \longrightarrow (F \wedge F)$

$F \longrightarrow F$ = True

17.

a) Ron lives in NJ or he is happy.

b) If Ron is happy, then he doesn't live in NJ.

c) Ron lives in NJ and he is not happy.

d) Ron doesn't live in NJ if and only if he is happy.

18.

P	q	~p	~q	~p ∨ q	~q ↔ p	(~p ∨ q) ⟶ (~q ↔ p)
T	T	F	F	T	F	**F**
T	F	F	T	F	T	**T**
F	T	T	F	T	T	**T**
F	F	T	T	T	F	**F**

Neither

19.

Converse: "If I travel, then I buy a car."

Inverse: "If I don't buy a car, then I will not travel."

Contrapositive: "If I don't travel, then I don't buy a car."

20.

P	q	~p	p ⟶ q	~(p ⟶ q)	~ p ∨ q
T	T	F	T	**F**	**T**
T	F	F	F	**T**	**F**
F	T	T	T	**F**	**T**
F	F	T	T	**F**	**T**

Not equivalent

21.

It is snowing: p $\quad p \wedge q$

I am going skiing: q $\quad q \longrightarrow r$

I will wear a coat: r $\quad p \longrightarrow r$

p	q	r	$p \wedge q$	$q \rightarrow r$	$(p \wedge q) \wedge (q \rightarrow r)$	$p \rightarrow r$	$[(p \wedge q) \wedge (q \rightarrow r)] \rightarrow (p \rightarrow r)$
T	T	T	T	T	T	T	**T**
T	T	F	T	F	F	F	**T**
T	F	T	F	T	F	T	**T**
T	F	F	F	T	F	F	**T**
F	T	T	F	T	F	T	**T**
F	T	F	F	F	F	T	**T**
F	F	T	F	T	F	T	**T**
F	F	F	F	T	F	T	**T**

Valid: Tautology

22. 3

23.

a) 42

b) 81

c) $^{-32}/_{243}$

24. 5,040

25. 420

26. 11,881,376

27. $^{1}/_{16}$

28.

a) $^{9}/_{16}$

b) $^{7}/_{16}$

29. $^{2}/_{5}$

30.

a) 1:2 or $^{1}/_{2}$

b) 1:1 or 1

31.

a) $^{5}/_{8}$

b) $^{2}/_{5}$

c) $^{27}/_{40}$

d) $^{1}/_{2}$

e) $\frac{12}{16} = \frac{3}{4}$

f) $\frac{2}{15}$

g) $\frac{25}{40} \cdot \frac{24}{39} = \frac{5}{13}$

h) $\frac{14}{40} \cdot \frac{13}{39} = \frac{7}{60}$

i) $\frac{2}{40} \cdot \frac{1}{39} = \frac{1}{780}$

32.

a) $^{2}/_{91}$

b) $^{4}/_{455}$

c) $^{5}/_{91}$

d) $^{24}/_{91}$

e) $^{33}/_{91}$

33. 0.25412

34.

a) $^{1}/_{55}$

b) $^{2}/_{11}$

35.

a) 1:24

b) 12:13

c) 13:12