

Solutions to Sample problems 1.

1. truth table

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

2. True

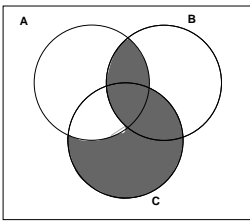
3. (a) i. John did not have a dog and did not have a cat as a pet.  
 ii. John had a dog or a cat as a pet and did not have a fish.  
 (b) i.  $d \vee \sim c$   
 ii.  $c \wedge f \wedge \sim d$

4. The answers are listed in column form.

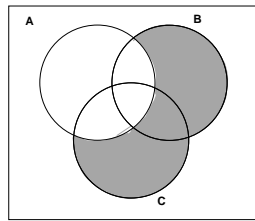
F	F	T
T	F	F
T	T	F
F	F	F

5. (a)  $\emptyset, \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}, \{c, b\}$ , and A.  
 (b)  $\emptyset, \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}, \{c, b\}$   
 (c) any two of the subsets above such that their intersection is empty.

6. part a)



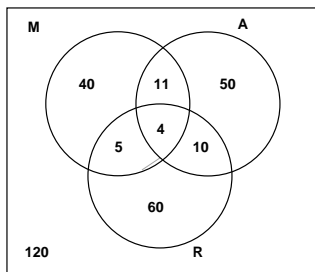
part b)



7. (a)  $(A \cap B^C \cap C^C) \cup (B \cap A^C \cap C^C)$   
 (b)  $(A^C \cap C) \cup (B^C \cap C) = (A^C \cup B^C) \cap C = (A \cap B)^C \cap C$

8. (a)  $\{1, 2, 4, 6, 7, 8\}$   
 (b)  $\{3, 5, 9\}$

9. (a) figure to the side  
 (b) 150  
 (c) 221  
 (d) 19  
 (e) 110



11. (a)  $S = \{(1, h), (1, t), (2, h), (2, t), (3, h), (3, t), (4, h), (4, t)\}$   
 (b) no they are not mutually exclusive since  $(2, h)$  is in both E and F.  
 (c) Any two subsets of S that are disjoint.
12. (a)  $\frac{2}{48}$   
 (b)  $\frac{17}{48}$   
 (c)  $\frac{3}{24}$   
 (d)  $\frac{1}{13}$
13.  $P(a) = \frac{12}{55}$
14. (a) .5  
 (b) No  
 (c) .7  
 (d) No  
 (e)  $\frac{.2}{.35}$   
 (f)  $\frac{.35}{.55}$
15. (a)  $\frac{30}{260}$   
 (b)  $\frac{30}{170}$   
 (c)  $\frac{120+30+40+20}{290+120} = \frac{210}{410}$
16. (a)  $\frac{4}{17}$   
 (b)  $\frac{3}{16}$   
 (c) .5735
17. (a)  $\frac{3}{13}$   
 (b)  $\frac{70}{143}$
18. (a) .8872  
 (b) .1090
19. (a) 0.08  
 (b) 0.8576  
 (c) 0.9788
20. 4 to 47
21.  $\frac{19}{22}$