Solutions to Sample problems 1.

1. truth table

p	q	$\sim p$	$\sim q$	$\sim p \wedge q$	$(\sim p \ \wedge \ q) \veebar \sim q$
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

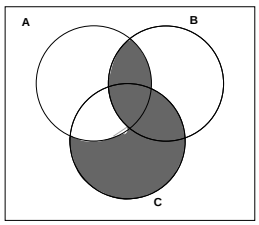
3. (a) i. John did not have a dog and did not have a cat as a pet.
   ii. John had a dog or a cat as a pet and did not have a fish.
   (b) i. $d \vee \sim c$
   ii. $c \wedge f \wedge \sim d$

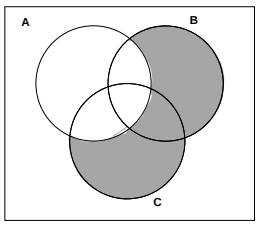
4. The answers are listed in column form.

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)

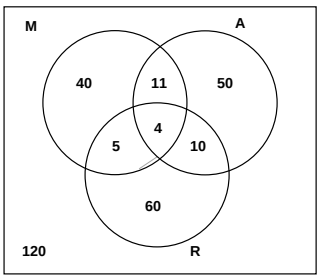




7. (a) $(A \cap B^C \cap C^C) \cup (B \cap A^C \cap C^C)$
   (b) $(A^C \cap C) \cup (B^C \cap C) = (A^C \cup B^C) \cap C) = (A \cap B)^C \cap C$

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



10. 3

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) $\frac{40}{270}$
    (b) $\frac{30}{170}$
    (c) $\frac{120+40+40+20}{290+130} = \frac{220}{420}$

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. $\frac{19}{22}$