1a. $A = \{R, O, M, E, A, N, D, J, U, L, I, T\}$

b. $B = \{J, U, L, I, S, C, A, E, \bullet, R\}$

c. $A \cup B = \{R, O, M, E, A, N, D, J, U, L, I, T, S, C\}$

f. $A \cap B = \{R, E, A, J, U, L, I\}$

d. $|A| = 12$

g. $|A \cap B| = 7$

e. $B' = \{B, D, F, G, H, K, M, N, O, P, Q, T, V, W, X, Y, Z\}$

2.a. $\{-1, 1\}$

b. $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11\}$

c. $\{0, 1, 4, 9, 16, 25, 36, 49, 64, 81\}$

d. $\emptyset$

3. $Q = \{2, 4, 6, 8, 10, 12, 14, 16, 18\}$

$R = \{\ldots -4, -2, 0, 2, 4, \ldots\}$

a. false   Q is not an element

b. false

c. false   6 is an element   not a set

d. true

e. true

f. true

4.a. $\{0, 1, 2, 3, 4, 5, 6\} = A \cup B$

b. $A \cap B = \{3\}$

5.

6a. $A' \cap B$
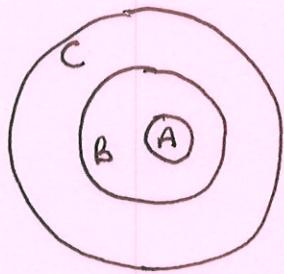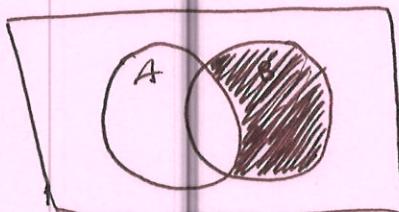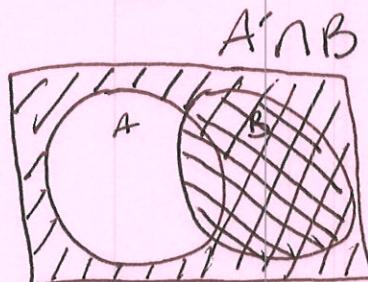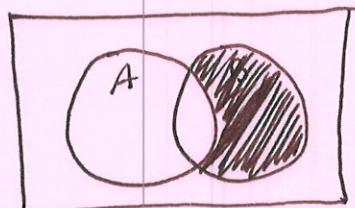
↗ note that

$$A' \cap B = B - A$$

these sets are equivalent

b. $B - A$

c.

$A \cap B$ $\cup$
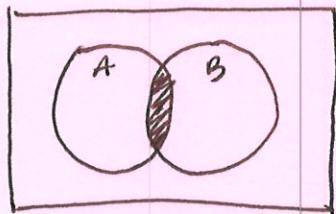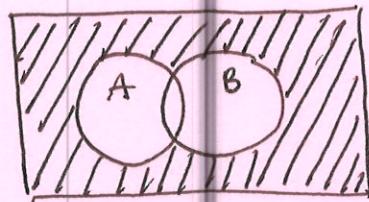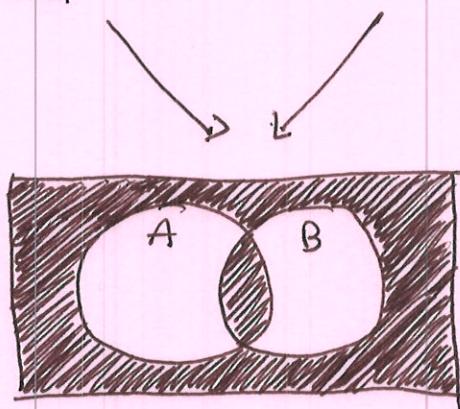
7. a. $\overset{A \times B}{\{}$ $(a,y), (a,z), (b,y), (b,z), (c,y), (c,z), (d,y), (d,z) \}$ 8

b. $A \times B \times C$

$\{ (a,y,0), (a,y,1), (a,z,0), (a,z,1), (b,y,0), (b,y,1), (b,z,0), (b,z,1),$
$(c,y,0), (c,y,1), (c,z,0), (c,z,1), (d,y,0), (d,y,1), (d,z,0), (d,z,1) \}$

16.

7e. $A^2 =$

$\{(a,a), (a,b), (a,c), (a,d), (b,a), (b,b), (b,c), (b,d), (c,a),$
$(c,b), (c,d), (c,d), (d,a), (d,b), (d,c), (d,d)\}$

8a. I did not buy a lottery ticket

b. If I bought a lottery ticket, then I won the million dollar jackpot.

c. I bought a lottery ticket if and only if I won the million dollar jackpot

d. I did not buy a lottery ticket and I did not win the million dollar jackpot.

e. I bought a lottery ticket or I won the million dollar jackpot.

f. I bought a lottery ticket and I won the million dollar jackpot.

g. If I did not buy the lottery ticket, then I did not win the million dollar jackpot.

h. Either I did not buy a lottery ticket or, I did buy a lottery ticket and I won the million dollar jackpot.

9. a. $\sim p$

b. $p \wedge \sim q$

c. $p \rightarrow q$

d. $\sim p \rightarrow \sim q$

e. $p \leftrightarrow q$

f. $q \wedge \sim p$

g. $q \rightarrow p$

10. a. for all n ($n^2 \geq 0$) if n is an integer.   true

b. there exists an n such that ($n^2 = 2$), if n is an integer false

c. There exists a unique x such that $x + 3 = 2x$ for x real
    $x = 3$ true

10d. There exists an x such that $x^2 = -1$ if x is real. false

e. for all x, $x^2 \neq x$ if x is real. false. $x=0, x=1$

f. there exists a unique x such that $x^2 = 1$ if x is real. false

$$x=1 \text{ or } x=-1 \text{ so not unique}$$

11. $\overset{50.}{100\%}$

12. If deal the cards many, many times, then a 3-of-a-kind should appear approximately in a ratio of 1 to 47 or in 47 attempts, you'll average one 3-of-a-kind in those attempts.

13. answers will vary.

14. no, its not correct since each at bat is independent

15. car accidents are so common, we actually stop paying attention. while plane crashes are both unusual and kill more people at the same time, and so it stands out to us.

16. $\frac{1}{20}$

17. GGG GGB GBG GBB BBB BBG BGB BGG

a. $\frac{1}{8}$, b. $\frac{3}{8}$

18. a. { young, middle-aged, elderly }

b. 234   (formulas in Excel key)

c. 524

d. Texas count 48, proportion $48/399 \approx 12.03\%$

e. count 93, proportion $= 93/399 \approx 23.31\%$