MATH 150  Chapter 8 Review Problems

This review sheet focuses on the major topics covered in Chapter 8. There are many finer points and other types of question which are not represented here. That does not mean you are not responsible for them. For example the question “100 ∈ \{x \mid x \text{ is a multiple of 10}\}” is a perfectly legitimate True/False question.

1. Let \( A = \{2, 4, 6, 8, 10\} \)
   a. How many subsets of \( A \) are there?   b. How many of these subsets are proper subsets?
   c. List all the subsets of \( A \).   d. Which of the subsets of \( A \) are proper subsets?
   e. How many of the subsets contain exactly three elements?   f. How many subsets contain at most 2 elements?

2. Let \( U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\} \), \( A = \{1, 2, 3, 4, 5\} \), \( B = \{3, 5, 6\} \), and \( C = \{2, 4, 8\} \). Find:
   a. \( A \cap B = \)   b. \( (A \cup B)' \cap C = \)   c. \( A' = \)   d. \( n(A) = \)   e. \( A \cup (C' \cap B') = \)

3. Let \( U = \{a, b, c, d, e, f, g\} \), \( A = \{a, b, c\} \), \( B = \{a, b, c, d\} \), \( C = \{a, e, f\} \). Identify each of the following as true or false. If false be able to state why.
   a) \( 3 \in C \)   b) \( A \subseteq B \)   c) \( B \subset A \)   d) \( (A \cup B)' = A' \cap B' \)   e) \( \{ \} \in C \)   f) \( (A' \cap C') \cap B' = \{d, e, f\} \)

4. Students were asked which of three eating establishments, Outback (O), El Cancun (E), and Royal Buffet (R), they liked. The following information was gathered:

<table>
<thead>
<tr>
<th></th>
<th>Brunettes (B)</th>
<th>Blondes (L)</th>
<th>Redheads (R)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males (M)</td>
<td>9</td>
<td>3</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>Females (F)</td>
<td>5</td>
<td>10</td>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>13</td>
<td>5</td>
<td>32</td>
</tr>
</tbody>
</table>

a) How many people were surveyed?   b) \( n(M \cap R) = \)   c) \( n(F' \cap B) = \)   d) \( n(L \cup F) = \)   e) \( n((B \cup R) \cap M) = \)

If one person were to be selected at random from those surveyed, find the following probabilities:

f. \( P(F) = \)   g. \( P(R') = \)   h. \( P(L \cup M) = \)   i. \( P(B' \cap F) = \)   j. \( P(L \mid F) = \)   k. \( P(M \mid B) = \)   l. \( P(L' \mid M') = \)
9. Draw and shade Venn diagrams for:  
   a. \((A \cap B)' \cap A'\)  
   b. \((A' \cup C) \cap (B \cup A)\)

10. Listed below are the probabilities of a certain event occurring. Find the probability of the event's complement.
   a. \(.57\)  
   b. \(3/7\)  
   c. 82%  
   d. \(1\)  
   e. \(0\)

11. The probability of \(A\) occurring is 3/8. Find:
   a. The odds in favor of event \(A\) =  
   b. The odds against \(A\) =  
   c. \(P(A')\) =  
   d. The odds in favor of \(A'\) =  
   e. The odds against \(A'\) = 

12. A box contains 7 red balls, 3 black balls, and 5 green marbles. If two marbles are selected at random, find the probability two green marbles are selected
   a) with replacement.  
   b) without replacement.

13. Using the marbles from problem 12, if two marbles are selected find:
   a. \(P(\text{red first, green second})\) with replacement  
   b. \(P(\text{red first, green second})\) without replacement  
   c. \(P(\text{red and green})\) with replacement  
   d. \(P(\text{red and green})\) without replacement  
   e. \(P(\text{red 2nd | green 1st})\) without replacement  
   f. \(P(\text{green 2nd | green 1st})\) without replacement  
   g. Be able to explain under what conditions and why successive picks are independent events.

14. Do the following problems from your text:
   
   Pg. 503 – 506  (18, 34, 44, 52, 54, 56, 64, 65)  
   Pg 517 – 519  (24, 44, 46, 60)  
   Pg. 525  (24, 28, 30)  
   Chapter 8 Review Problems, p. 527 -532, odds