Introduction to Probability Theory I

Exercise 1, Autumn 2009

1. One of numbers $\{1, 2, \ldots, 1000\}$ is picked randomly. Determine the probability that this number is
   a) divisible by 7;
   b) divisible by 7 and is not divisible by 17;
   c) square on an integer;
   d) cube of an integer.
2. Consider a game where two dice are thrown. Find the propabilities that
   a) sum of the results is 7,
   b) both results are at most 4,
   c) at least one of the results is at most 3.
3. Assume that $P(A) = 0.45$ and $P(B) = 0.75$. What can you say of $P(A \cap B)$.
4. Consider events A and B.
   (i) State following events using elementary set operations:
       a) both events occur,
       b) neither of event occurs,
       c) at least one event occurs,
       d) exactly one event occurs.
   (ii) Find probability theoretic intepretations for complements of these events.
5. Assume that $P(A) = 0.6$, $P(B) = 0.4$ and $P(A \cap B) = 0.2$. Find: a) $A \cup B$, b) $A^{\mathcal{C}}$, c) $A \cap B^{\mathcal{C}}$, d) $A \cup B^{\mathcal{C}}$, e) $A^{\mathcal{C}} \setminus B^{\mathcal{C}}$.
6. A small town has three daily newspapers (A, B and C). Following table displays the readership of these papers:

A: 20%	B:16%	C:14%
A and B: 8%	A and C: 5%	B and C: 4%
A, B and C: 2%.		

   Find the probability that a randomly selected person reads:
   a) no newspapers,
   b) reads paper A but does not read paper B or C,
   c) reads exactly one of these newspapers.