Probability Word Problems

1. A box contains three items that are labeled A, B, and C. Two items are selected at random (without replacement) from this box. List all the possible outcomes for this experiment.

$$S = \{AB, AC, BC\}$$

2. In a group of 50 executives, 27 have a type A personality. If one executive is selected at random from this group, what is the probability that this executive has a type A personality?

   27/50

3. Determine whether each of the following numbers could represent the probability of an event. Explain why or why not.
   a. $\frac{25}{25}$
   b. 333.3%
   c. 2.3
   d. -0.0004
   e. 0
   f. $\frac{320}{105}$
      a) Yes. It is between [0,1]
      b) No, it can not be over 100%
      c) No, it can not be over 1.
      d) No it can not be negative.
      e) Yes.
      f) No, it is over 1.

4. Below are probabilities an event *will not* happen. Find the probability that they will happen for each (find the compliment of each event):
   a. 0.95
   b. 0.13
   c. $\frac{3}{4}$
   d. $\frac{21}{61}$
      a) 0.05
      b) 0.87
      c) ¼
      d) 40/61

5. Five hundred employees were selected from a city's large private companies, and they were asked whether or not they have retirement benefits. Based on their answers the following table was prepared:

	HAS BENEFITS	**DOES NOT HAVE BENEFITS**
MALE	225	75
FEMALE	150	50

If one employee is selected at random from these 500 employees, find the probability that this employee:

a. Is a woman
b. Has retirement benefits
c. Has retirement benefits given that the employee is a man
d. Is a woman given that she does not have retirement benefits
   a) 2/5
   b) $\frac{375}{500} = 3/4$
   c) 3/4
   d) 2/3

6. The distribution of blood types varies among groups of people. Here is the distribution of blood types for a randomly chosen person in the United States:

Blood Type	O	A	B	AB
U.S. probability	0.45	0.40	0.11	?

   a. What is the probability of type AB blood in the U.S.?
   b. Maria has type B blood. She can safely receive blood transfusions from people with blood types O and B. What is the probability that a randomly chosen American can donate blood to Maria?
      a) 0.04
      b) 0.56

7. Choose a young adult at random. The probability is 0.12 that the person chosen did not complete high school, 0.31 that the person has a high school diploma but no further education, and 0.29 that the person has at least a bachelor's degree. This data is represented in the table below.

	Less Than High School Diploma	High School Diploma	Some College or Technical School	Bachelor's Degree or Higher
Probability that a young adult has completed this level of education	0.12	0.31		0.29

   a. What is the probability that a randomly chosen young adult has some education beyond high school but does not have a bachelor's degree?
   b. What is the probability that a randomly chosen young adult has at least a high school education?
      a) 0.28
      b) 0.88

8. In a sample of 1446 U.S. registered voters, 217 said that John Kennedy was the best president since World War II. Two registered voters are selected at random without replacement.
    a. Find the probability that both registered voters say that John Kennedy was the best president since World War II.
    b. Find the probability that neither registered voters say that John Kennedy was the best president since World War II.
    c. Find the probability that at least one of the two registered voters say that John Kennedy was the best president since World War II.
        a) 0.0224
        b) 0.722
        c) 0.278