1. (a) False  
(b) False  
(c) True  

2. (a) \( r \land \sim m \)  
(b) \( m \land (r \lor p) \)  

3. Venn diagram

4. (a) \( 30 + 8 + 20 = 58 \)  
(b) \( 15 + 3 \)  
(c) \( \frac{8+5}{30+8+10+5} = \frac{13}{55} \)  

5. (a) \( A^C = \{a, d\} \) thus \( a + p_4 = 0.41 \) \( p_4 = 0.3 \) Also \( p_3 = p_4 = 0.3 \)  
Since all probability adds up to 1 this gives \( p_5 = 0.15 \)  
(b) \( P(B|A) = \frac{P(B \cap A)}{P(A)} = \frac{0.14}{0.14 + 0.15} = \frac{0.14}{0.29} \)  

6. \( \frac{3}{23} \)  

7. (a) \( \frac{290 + 178 - 90}{565} = \frac{378}{565} \)  
(b) \( P(\text{none} | \text{freshman}) = \frac{15}{165} \)  

8. (a) \( S = \{ \text{AB, AC, AD, BC, BD, CD} \} \)  
(b) \( J = \{ \text{AB, AC, AD} \} \)  
(c) many different answers. \( K = \{ \text{AB, BC} \} \)  

9. first item is defective and the second item is not defective  
\( \frac{4}{14} \times \frac{10}{13} \)  

10. (a) Use a venn diagram to get that \( P(A \cap B) = 0.3 \)  
Since \( P(A) \times P(B) = 0.45 \times 0.7 = 0.315 \) and this is not equal to \( P(A \cap B) \), A and B are not independent.