MATH 110 - EXAM 1 - SOLUTIONS

1. (a) \( X = D \cap S \)

(b) \( S' \cap (A \cup D) = \{ \text{Applicants who have not received a speeding ticket but who have either caused an accident or been arrested for drunk driving} \} \)

2. \( n(S \cup T) = n(S) + n(T) - n(S \cap T) \)

\[ 25 = 18 + 10 - n(S \cap T) \]

\[ 25 = 28 - n(S \cap T) \]

\[ n(S \cap T) = 3 \]

3. \( S = \{ \text{Students who ski} \} \)

\( H = \{ \text{Students who play hockey} \} \)

(a) \[
\begin{array}{c}
S & H \\
\hline
250 & 150 \\
\hline
\end{array}
\]

(b) \( 250 + 150 + 150 = 550 \) students in \( S \cup H \).
4. There are 4 choices for each of 5 questions so by Multiplication Principle there are
\[ 4^5 = 1024 \] ways to do the quiz.

5. In this case the order of the choice matters so there are \( P(20,3) = 20 \times 19 \times 18 = 6840 \) ways to choose the board of directors.

6. Making a word consists of choosing the 7 positions out of 12 for the A's and filling the remaining positions with B's (or equivalently choosing the 5 positions out of 12 for the B's and filling the remaining positions with A's). There are

\[ \binom{12}{7} = \binom{12}{5} = \frac{12 \times 11 \times 10 \times 9 \times 8}{5 \times 4 \times 3 \times 2} = 792 \] ways to do this.