1. Write a symbolic expression for the following argument. Then build its truth table to deterine if the argument is valid. *(7 points)*

   > If you study hard, you make good grades. If you don't get a good job, then you didn't make good grades. You don't get a good job. Therefore, you didn't study hard.

2. If $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$, $A = \{1, 3, 5, 7, 8, 9\}$, and $B = \{2, 3, 4, 6, 7, 10.11\}$, find $A \cup B'$. *(6 points)*

3. In a survey of 527 students, we find that 320 like history courses, 288 like sociology courses, and 52 like neither. How many like both? Draw a properly labelled Venn diagram to illustrate. *(7 points)*