CS2022/MA2201
HW#2

DUE: Tuesday, September 7

1. (12 points) Do **Exercise 1.3.22** of our text.

2. (5 points) Do **Exercise 1.3.24** of our text.

3. (4 points) (*a*) Give an interpretation in which $(\forall x)(\exists y)\big(P(x)\vee Q(x,y)\big)$ is true.
(*b*) Give an interpretation in which $(\forall x)(\exists y)\big(P(x)\vee Q(x,y)\big)$ is false.

4. (8 points) Do **Exercise 1.4.16** of our text. For each problem for which your answer is *yes*, describe the set whose power set is displayed.

5. (5 points) Let Z^+ be the set of positive integers. That is, $Z^+=\{1, 2, 3, 4,...\}$. For $x,y\in Z^+$, define the (infix) predicate $|$ by $x|y \Leftrightarrow (\exists z\in Z^+)\, y = x*z$, that is $x|y$ means that *x* divides *y* evenly. Finally, define $R=\{x\in Z^+ \mid 2|x\}$ (*R* is the set of all even positive integers), $S=\{x\in Z^+ \mid 3|x\}$ and $T=\{x\in Z^+ \mid 6|x\}$.
(*a*) Is $R\subseteq S$?
(*b*) Is $R\subseteq T$?
(*c*) Is $T\subseteq R$?
(*d*) Is $T\subseteq S$?
(*e*) What is $R\cap S\cap T$?

6. (2 points) Is the following statement true or false?
For all sets *A* and *B*, $A\subseteq B$ if and only if $A-B=\varnothing$.