# §2.2 Homework Solutions

2) a) b) [BB]  c) $\mathbb{Z}\cap(S\cup T)=\{2,4,5,6,25\}=(\mathbb{Z}\cap S)\cup(\mathbb{Z}\cap T)$ (they are equal).

d) $\mathbb{Z}\cup(S\cap T)=\{-2,-1,0,1,\sqrt{2},2,3,\ldots\}=(\mathbb{Z}\cup S)\cap(\mathbb{Z}\cup T)$ (they are equal).

4) $A=\{(1,1),(1,2),(2,2),(1,3),(2,3),(3,3)\}$, $B=\{1,-1,2,-2\}$ (removing the repeats)

10) a) b) [BB]  c) $M\cap P\neq\emptyset$  d) $(CS\cap T^c)\subseteq P$  e) $((M\cup CS)\cap P)\subseteq T^c$

12) a) [BB]  b) $0\in\mathbb{Z}\setminus\mathbb{N}$  c) $\mathbb{N}\subseteq\mathbb{Z}$  d) $\mathbb{Z}\not\subseteq\mathbb{N}$

16) a) A is a subset of B, ie $A\subseteq B$  b) $A\cup B=A\Rightarrow B\subseteq A$

17) [BB]

27) a) [BB]  b) No. A counterexample is $A=\{1\}$, $B=\{2\}$, $C=\{3\}$

c) Yes. Let $x\in B$

Case 1) Suppose $x\in A\Rightarrow x\notin A\oplus B\Rightarrow x\notin A\oplus C\Rightarrow x\in C$

Case 2) Suppose $x\notin A\Rightarrow x\in A\oplus B\Rightarrow x\in A\oplus C\Rightarrow x\in C$

The above proves that $B\subseteq C$. Reversing the B and C proves $C\subseteq B$. Thus $B=C$.

d) False. A may be ~~the~~ $\emptyset$.