1) Let P(x) be the statement “will fail this class”. Where the universe of discourse consists of all students in class. Express $\forall x, \neg P(x)$ in English (1.3-5)

“No student will fail this class”

2) Let P(x) denote “x is my friend”. Let Q(x) denote “x is perfect”. Translate “Not everyone of my friends is perfect” into a logical expression using quantifiers and connectives.

$\exists x \ P(x) \land \neg Q(x)$, or equivalently $\neg (\forall x \ P(x) \rightarrow Q(x))$

3) Mark how the following Processing program should be modified so that it can be used to verify whether $\forall i \exists! j : (i \neq j) \land (T[i]=T[j])$ where the domain is [1,6].

```java
int n=6;
int T[] = new int [n];
boolean trueValue=true;
for (int i=0; i<n; i++) {
    int foundMatch= 0;
    for (int j=0; j<n; j++) {
        if ((i!=j)&&(T[i]==T[j])) {foundMatch ++ ;};
    }
    if (foundMatch != 1) {trueValue=false;};
}
println("truevalue="+trueValue);
```

4) M(x,y) means “x has called y”. T(x,y) means “x has emailed y”. Use quantifiers to express: “There are at least two students who, between them have e-mailed or called everyone else in the class.” (13n)

$\exists x \exists y \forall z ((z\neq x) \land (z\neq y)) \rightarrow (T(x,z) \lor T(y,z) \lor M(x,z) \lor M(y,z))$

5) Consider the following argument
Premise1: If you did all the assigned exercises you will get an A in the class
Premise 2: You got an A in the class
Conclusion: You did all the assigned exercises
Is it valid? __ No __. If not, what is such an argument called? _____ Fallacy ______

Explain why it is not valid (assuming that P stands for “you did the assigned exercises” and Q stands for “you got an A”). __ The argument ((P\rightarrow Q) \land Q) \rightarrow P is not a tautology. Assume that P is false and Q is true. Then, (P\rightarrow Q) is true, but P is false. Hence ((P\rightarrow Q) \land Q) \rightarrow P is false. _______