Midterm (30 pts)

1 Programming FLEX (8 + 2 pts)

We abstract the task of recognizing and replacing IP addresses in WSU documents. Write a complete FLEX specification for a scanner that (1) reads text from stdin, (2) replaces every occurrence of WSU IP address of the form 130.108.N.N with *HIDDEN*IP* and (3) writes it to stdout. N in the IP address template stands for a sequence of one to three digits in the range 0 to 255 without redundant 0’s in the prefix. For example, N can be 0, 1, 2, 10, 25, 249, 255, etc., but cannot be 01, 005, 259, etc. That is, syntactically valid IP addresses such 130.108.16.32, 130.108.0.1, and 130.108.17.198 should be replaced, while illegal IP addresses or arbitrary strings should be copied to the output as is.

Can IP addresses span multiple lines according to your specification?

2 Regular Languages (3 + 4 pts)

Construct a regular expression and a minimal DFA for the language of binary numerals that are divisible by 4. That is, 100 $\in L$, 00000000000000 $\in L$, 00110101 $\in L$, 1001 $\not\in L$, etc. It is upto you to include or exclude $\lambda$ from $L$.

3 Cool Language (7 + 6 pts)

Clearly point out all errors in the following Cool code and justify them in terms of the specification given in the Cool Language Reference.

```cool
class Main {
    i : int <- 0;
    p : Bool <- FALSE;
    main() : SELF_TYPE {
        Int j <- 1;
        {
            out_string("enter a string-->");
            if (true)
                then i
            else j
        fi;
    }
}
```

Now give the corrected Cool program that compiles without any errors.