Wright State University
Department of Computer Science and Engineering

CS 780 Fall 2010 Prasad

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, $100 \in \mathcal{L}$, $00000000000000 \in \mathcal{L}$, $0011100 \in \mathcal{L}$, $1001 \notin \mathcal{L}$, etc. It is upto you to include or exclude λ from $\mathcal{L}$.

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.

```
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.