2.1
a  a
b  (a)
c  (a+a)
d  ((a+a)*a)

2.3 (Don’t write up or submit, but you should be able to do)

2.4
b  ** Also build in JFLAP
c
e

2.6
a  ** Also build in JFLAP
b

2.9 Give a CFG for the following language: \{ a^n b^j c^k \mid n = j \ or \ n = k \ where \ n, j, k \geq 0 \}

2.13
a
b

2.19

2.23 Use D = \{ x#y \mid x, y \in \{0,1\}^* \ and \ x \neq y \} and

i)  Show that D is a context free language.
ii) Show that D is or is not regular.
Additional:

1) Consider the following C++ program

```cpp
int main ()
{
    int a;
    int b;
    int sum;
    a = 40;
    b = 6;
    sum = a+b;
    cout << "sum is " << sum << endl;
    return 0;
}
```

and initial parts of a CFG for C++:

```plaintext
<program>  ->  int main () <block>
<block>    ->  { <stmt-list> }
<stmt-list> ->  <stmt> | <stmt><stmt-list> | <decl> | <decl><stmt-list>
<decl>     ->  int <id> ; | double <id> ;
<stmt>     ->  <assn-stmt> | <cout-stmt> | <return-stmt>
<assgn-stmt> ->  <id> = <expr> ;
<expr>     ->  <expr> + <expr> | <expr>*<expr> | (<expr>)<id>
<cout-stmt> ->  cout <out-list> ;
<return-stmt> ->  return <integer> ;
```

Finish expanding all nonterminals (esp. <out-list>) to the extent that you can produce a derivation of the above program.

```plaintext
<program>  ->  int main() <block>
            ->  int main() { <stmt-list> }
            ->  etc.
```

NOTE: To avoid rewriting so many statements, you are welcome to break the derivation into parts.

Type your solutions into Google Docs or into a Word document. Draw pictures when necessary. ASCII art is acceptable for pictures, or you can use the Insert Drawing function in Google Docs, or maybe JFLAP. Start early, come see me with questions.