Dylan Parsons

CS 2320

Class Participation #4

10/12/17

CNF Grammar:

S 🡪 AX | AB

X 🡪 SB

A 🡪 0

B 🡪 1

We start with the sentence, 0011. Each 0 is produced by A, and 1 by B.

|  |
| --- |
|  |
|  |  |
|  |  |  |
| A | A | B | B |
| 0 | 0 | 1 | 1 |

We check each adjacent pair: AA, AB, and BB. Only AB can be directly produced: by S.

|  |
| --- |
|  |
|  |  |
|  | S |  |
| A | A | B | B |
| 0 | 0 | 1 | 1 |

Since the cells to the left and right of S weren’t filled, we check S with the corresponding symbols from the previous row: AS, AS, SB, and SB again. SB can be produced by X.

|  |
| --- |
|  |
|  | X |
|  | S |  |
| A | A | B | B |
| 0 | 0 | 1 | 1 |

Finally, we check X with the symbols that were missing: AX and AX. AX can be produced by S.

|  |
| --- |
| S |
|  | X |
|  | S |  |
| A | A | B | B |
| 0 | 0 | 1 | 1 |

We’ve reached the top, and we have the start symbol! Here we can stop, and 0011 can be parsed.

Next, we have 01010. This has more checks & steps, so I’ll go into more detail. We start the same way.

|  |
| --- |
|  |
|  |  |
|  |  |  |
|  |  |  |  |
| A | B | A | B | A |
| 0 | 1 | 0 | 1 | 0 |

Of these pairs, AB, BA, AB, BA, only AB can be produced.

|  |
| --- |
|  |
|  |  |
|  |  |  |
| S |  | S |  |
| A | B | A | B | A |
| 0 | 1 | 0 | 1 | 0 |

Now we check the pairs S, S, S. The first came from B and A, so we check SB, SA. SB is produced by X. The second pair, S, evaluates to BS, AS. Neither of these can be produced. The last is S again, and the again comes from B and A. So of SB, SA, only SB can be produced.

|  |
| --- |
|  |
|  |  |
| X |  | X |
| S |  | S |  |
| A | B | A | B | A |
| 0 | 1 | 0 | 1 | 0 |

Now, we’re checking X and X. Here, came from S, which in turn evaluates to B and A. So we check for XB, XA, and XS. None of these can be produced. Second, X means we check BX, AX, and SX. AX is produced by S.

|  |
| --- |
|  |
|  | S |
| X |  | X |
| S |  | S |  |
| A | B | A | B | A |
| 0 | 1 | 0 | 1 | 0 |

Finally, we check S. This came from X, and that came from S, and that came from B and A. So we check BS, AS, and XS. Of course, the only time S appears is X 🡪 SB, so we cannot produce a symbol for the top. So this sentence cannot be parsed!

|  |
| --- |
|  |
|  | S |
| X |  | X |
| S |  | S |  |
| A | B | A | B | A |
| 0 | 1 | 0 | 1 | 0 |