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HW 09

1. Grammar – 0: S’ -> S $, 1: S -> D, 2: D -> d E, 3: D -> E, 4: E -> e, 5: E ->

LR(0):

0a: S’ -> • S $, 0b: S’ -> S • $, 0c: S’ -> S $ •

1a: S -> • D, 1b: S -> D •

2a: D -> • d E, 2b: D -> d • E, 2c: D -> d E •

3a: D -> • E, 3b: D -> E •

4a: E -> • e, 4b: E -> e •

5a: E -> • , 5b: E -> •

1. SLR(1)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| State | Items | Action | | | | Go To | | |
| d | e |  | $ | S | D | E |
| 0 | 0a: S’ -> • S $  1a: S -> • D  2a: D -> • d E  3a: D -> • E  4a: E -> • e  5b: E -> • | S3:{2b, 4a, 5b} | S6:{4b} | S7:{5b} |  | S1:{0b} | S2:{1b} | S5:{3b} |
| 1 | 0b: S’ -> S • $ |  |  |  | accept |  |  |  |
| 2 | 1b: S -> D • |  |  |  | R1 |  |  |  |
| 3 | 2b: D -> d • E  4a: E -> • e  5b: E -> • |  | S6:{4b} | S7:{5b} | R2 |  |  | S4:{2c} |
| 4 | 2c: D -> d E • |  |  |  | R2 |  |  |  |
| 5 | 3b: D -> E • |  |  |  | R3 |  |  |  |
| 6 | 4b: E -> e • |  |  |  | R4 |  |  |  |
| 7 | 5b: E -> • |  |  |  | R5 |  |  |  |

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| --- | --- | --- |
| Stack | Input | Action |
| 0 | d $ | S3 |
| 0 d 3 | $ | R2 |
| 0 D 2 | $ | R1 |
| 0 S 1 | $ | Accept |

|  |  |  |
| --- | --- | --- |
| Stack | Input | Action |
| 0 | e $ | S6 |
| 0 e 3 | $ | R4 |
| 0 E 3 | $ | Error |

1. Grammar – 0: S’ -> S $, 1: S -> B, 2: S -> D, 3: B -> i B e B, 4: B -> s, 5: D -> i B e D, 6: D -> i S

LR(1) items

0a: S’ -> • S $, , 0b: S’ -> S • $, , 0c: S’ -> S $ • ,

1a: S -> • B, {$}, 1b: S -> B • , {$}

2a: S -> • D, {$}, 2b: S -> D • , {$}

3a: B -> • i B e B, {e, $}, 3b: B -> i • B e B, {e, $}, 3c: B -> i B • e B, {e, $}, 3d: B -> i B e • B, {e, $},

3e: B -> i B e B •, {e, $}

4a: B -> • s, {e, $}, 4b: B -> s • , {e, $}

5a: D -> • i B e D, {$}, 5b: D -> i • B e D, {$}, 5c: D -> i B • e D, {$}, 5d: D -> i B e • D, {$}

5e: D -> i B e D • , {$}

6a: D -> • i S, {$}, 6b: i • S, {$}, 6c: i S • , {$}

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| State | Items | Action | | | | Go To | | |
| i | e |  | $ | S | B | D |
| 0 | {0a, 1a, 2a, 3a, 4a, 5a, 6a} | S4 | R4 | S8 | R6 | S1 | S2 | S3 |
| 1 | {0b} |  |  |  | accept |  |  |  |
| 2 | {1b} |  |  |  | R1 |  |  |  |
| 3 | {2b} |  |  |  | R2 |  |  |  |
| 4 | {3b, 5b, 3a, 4a, 6b} | S4 | R4 | S8 | R6 |  | S5 |  |
| 5 | {3c, 5c} |  | S6 |  | R5 |  |  |  |
| 6 | {3d, 3a, 4a, 5d, 5a, 6a} | S4 | R4 | S8 | R6 |  | S7 | S10 |
| 7 | {3e} |  | R3 |  | R3 |  |  |  |
| 8 | {4b} |  | R4 |  | R4 |  |  |  |
| 9 | {5e} |  |  |  | R5 |  |  |  |
| 10 | {6c} |  |  |  | R6 |  |  |  |

|  |  |  |
| --- | --- | --- |
| Stack | Input | Action |
| 0 | i i s $ | S4 |
| 0 i 4 | i s $ | S4 |
| 0 i 4 i 4 | s $ | S8 |
| 0 i 4 i 4 s 8 | $ | R4 |
| 0 i 4 i 4 B 4 | $ | R5 |
| 0 i 4 D 5 | $ | Error |

|  |  |  |
| --- | --- | --- |
| Stack | Input | Action |
| 0 | i s e i s e s $ | S4 |
| 0 i 4 | s e i s e s $ | S8 |
| 0 i 4 s 8 | e i s e s $ | R4 |
| 0 i 4 B 6 | e i s e s $ | S6 |
| 0 i 4 B 6 e 6 | i s e s $ | S4 |
| 0 i 4 B 6 e 6 i 4 | s e s $ | S8 |
| 0 i 4 B 6 e 6 i 4 s 8 | e s $ | R4 |
| 0 i 4 B 6 e 6 i 4 B 6 | e s $ | S6 |
| 0 i 4 B 6 e 6 I 4 B 6 e 6 | s $ | S8 |
| 0 i 4 B 6 e 6 i 4 B 6 e 6 s 8 | $ | R4 |
| 0 i 4 B 6 e 6 i 4 B 6 e 6 B 4 | $ | R3 |
| 0 i 4 B 6 e 6 B 3 | $ | R3 |
| 0 B 3 | $ | R1 |
| 0 S 1 | $ | Accept |

|  |  |  |
| --- | --- | --- |
| Stack | Input | Action |
| 0 | i i s e s e s $ | S4 |
| 0 i 4 | i s e s e s $ | S4 |
| 0 i 4 i 4 | s e s e s $ | S8 |
| 0 i 4 i 4 s 8 | e s e s $ | R4 |
| 0 i 4 I 4 B 4 | e s e s $ | S6 |
| 0 i 4 i 4 B 4 e 6 | s e s $ | S8 |
| 0 i 4 i 4 B 4 e 6 s 8 | e s $ | R4 |
| 0 i 4 i 4 B 4 e 6 B 4 | e s $ | S6 |
| 0 i 4 i 4 B 4 e 6 B 4 e 6 | s $ | S8 |
| 0 i 4 i 4 B 4 e 6 B 4 e 6 s 8 | $ | R4 |
| 0 i 4 i 4 B 4 e 6 B 4 e 6 B 4 | $ | Error |