

Problem 1

1.

(1.1)

```
"\" [1-9] [0-9] [0-9] [0-9] "-" (0 [1-9] | 1 [0-2]) "-" (0 [1-9] | [12] [0-9] | 3 [01]) "\"
```

(1.2)

```
"\" [1-9] [0-9] [0-9] [0-9] "-" (0 [1-9] | 1 [0-2]) "-" (0 [1-9] | [12] [0-9] | 3 [01])  
  "T" ([01] [0-9] | 2 [0-3]) ":" ([0-5] [0-9]) ":" ([0-5] [0-9]) "\"
```

(1.3)

```
"\" [1-9] [0-9] [0-9] [0-9] "-" (0 [1-9] | 1 [0-2]) "-" (0 [1-9] | [12] [0-9] | 3 [01])  
  "T" ([01] [0-9] | 2 [0-3]) ":" ([0-5] [0-9]) ":" ([0-5] [0-9])  
  ("Z" | ["+" "-" ]) (0 [0-9] | 1 [01]) ":" ([0-5] [0-9]) | "12:00") "\"
```

2.

Output1:

begin match:

find match request

next:

begin find arrow

begin str

find localDateTimeStr:"2024-11-22T12:00:00"

next:

begin find arrow

begin str

find offsetDateTimeStr:"2024-11-22T14:00:00+08:00"

end match

Output2:

begin match:

find match request

next:

begin find arrow

begin str

invalid matchStr

Output3:

begin match:

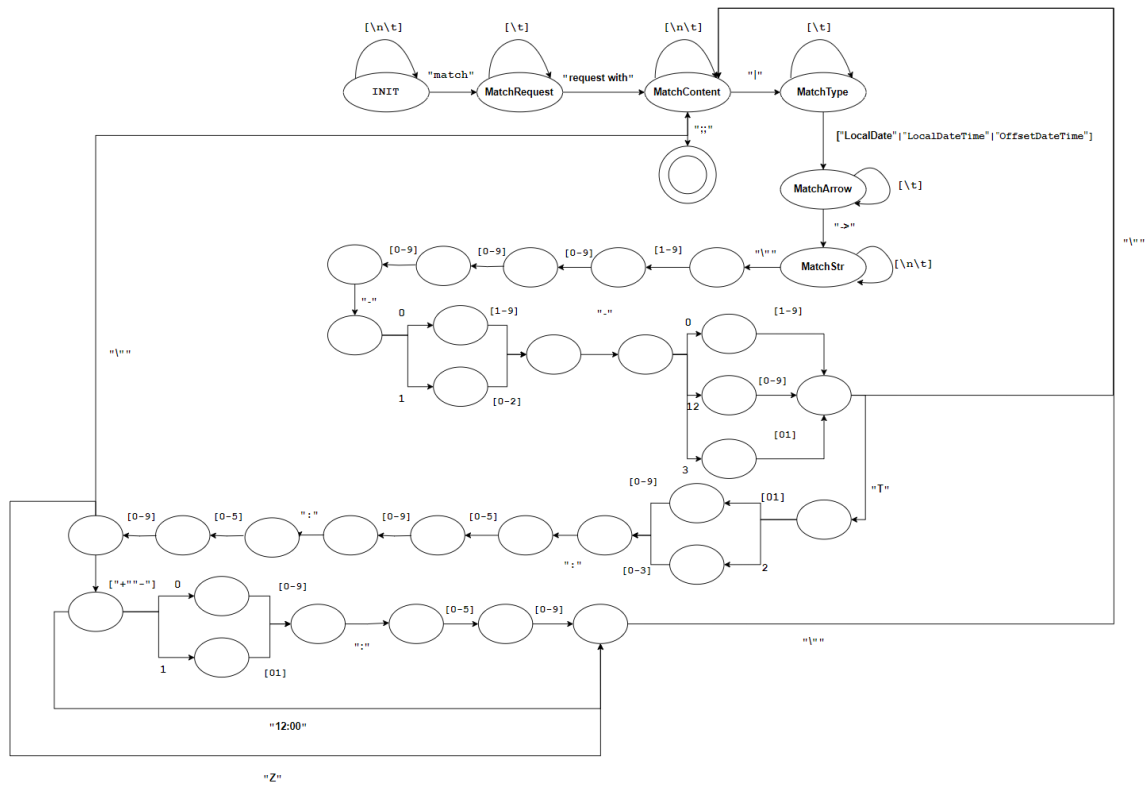
find match request

next:

begin find arrow

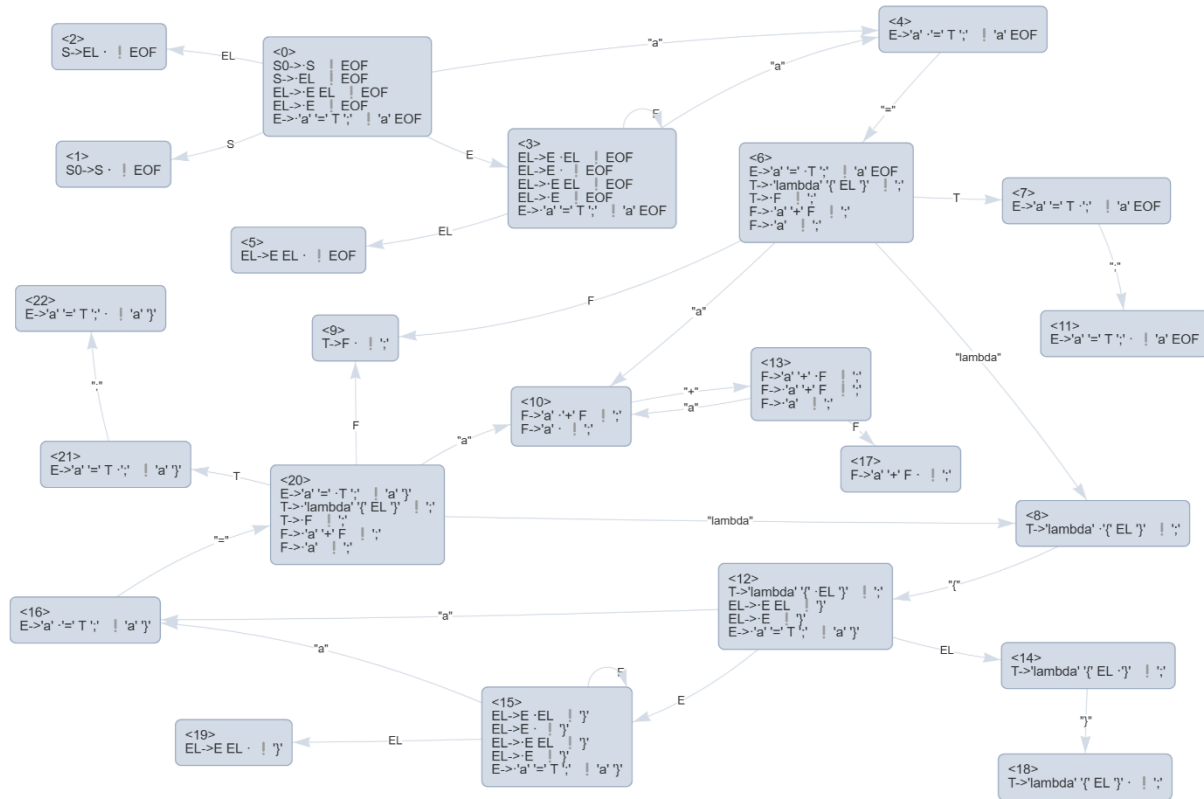
error in find arrow

3.



Problem 2

- It's an LR(1) grammar.
(Note that S0 here represents S')



(Note that repeated states in this problem will result in point deductions, and incomplete closures within each node will also lead to point deductions.)

2. No conflict.

LR table														
State	ACTION								GOTO					
	a	=	;	lambda	{	}	+	\$	S'	S	EL	E	T	F
0	s4									1	2	3		
1								acc						
2								r ₁						
3	s4							r ₃			5	3		
4		s6												
5								r ₂						
6	s10			s8									7	9
7			s11											
8					s12									
9			r ₆											
10			r ₈				s13							
11	r ₄							r ₄						
12	s16										14	15		
13	s10													17
14					s18									
15	s16				r ₃						19	15		
16		s20												
17			r ₇											
18			r ₅											
19					r ₂									
20	s10			s8									21	9
21			s22											
22	r ₄					r ₄								

(Note that repeated states in the 2.1 will not be scored in the 2.2, but there will be no additional point deductions for the repeats.)

3.

Step	Stack	Act
1	0	s4
2	0 a 4	s6
3	0 a 4 = 6	s8
4	0 a 4 = 6 lambda 8	s12
5	0 a 4 = 6 lambda 8 { 12	s16
6	0 a 4 = 6 lambda 8 { 12 a 16	s20
7	0 a 4 = 6 lambda 8 { 12 a 16 = 20	s8
8	0 a 4 = 6 lambda 8 { 12 a 16 = 20 lambda 8	s12
9	0 a 4 = 6 lambda 8 { 12 a 16 = 20 lambda 8 { 12	s16
10	0 a 4 = 6 lambda 8 { 12 a 16 = 20 lambda 8 { 12 a 16	s20
11	0 a 4 = 6 lambda 8 { 12 a 16 = 20 lambda 8 { 12 a 16 = 20	s10
12	0 a 4 = 6 lambda 8 { 12 a 16 = 20 lambda 8 { 12 a 16 = 20 a 10	s13
13	0 a 4 = 6 lambda 8 { 12 a 16 = 20 lambda 8 { 12 a 16 = 20 a 10 + 13	s10
14	0 a 4 = 6 lambda 8 { 12 a 16 = 20 lambda 8 { 12 a 16 = 20 a 10 + 13 a 10	r8
15	0 a 4 = 6 lambda 8 { 12 a 16 = 20 lambda 8 { 12 a 16 = 20 a 10 + 13 F 17	r7
16	0 a 4 = 6 lambda 8 { 12 a 16 = 20 lambda 8 { 12 a 16 = 20 F 9	r8
17	0 a 4 = 6 lambda 8 { 12 a 16 = 20 lambda 8 { 12 a 16 = 20 T 21	s22
18	0 a 4 = 6 lambda 8 { 12 a 16 = 20 lambda 8 { 12 a 16 = 20 T 21 ; 22	r4
19	0 a 4 = 6 lambda 8 { 12 a 16 = 20 lambda 8 { 12 E 15	r3
20	0 a 4 = 6 lambda 8 { 12 a 16 = 20 lambda 8 { 12 EL 14	s18
21	0 a 4 = 6 lambda 8 { 12 a 16 = 20 lambda 8 { 12 EL 14 } 18	r5
22	0 a 4 = 6 lambda 8 { 12 a 16 = 20 T 21	s22
23	0 a 4 = 6 lambda 8 { 12 a 16 = 20 T 21 ; 22	r4
24	0 a 4 = 6 lambda 8 { 12 E 15	s16
25	0 a 4 = 6 lambda 8 { 12 E 15 a 16	s20
26	0 a 4 = 6 lambda 8 { 12 E 15 a 16 = 20	s10
27	0 a 4 = 6 lambda 8 { 12 E 15 a 16 = 20 a 10	s13
28	0 a 4 = 6 lambda 8 { 12 E 15 a 16 = 20 a 10 + 13	s10
29	0 a 4 = 6 lambda 8 { 12 E 15 a 16 = 20 a 10 + 13 a 10	r8
30	0 a 4 = 6 lambda 8 { 12 E 15 a 16 = 20 a 10 + 13 F 17	r7
31	0 a 4 = 6 lambda 8 { 12 E 15 a 16 = 20 F 9	r8
32	0 a 4 = 6 lambda 8 { 12 E 15 a 16 = 20 T 21	s22
33	0 a 4 = 6 lambda 8 { 12 E 15 a 16 = 20 T 21 ; 22	r4
34	0 a 4 = 6 lambda 8 { 12 E 15 E 15	r3
35	0 a 4 = 6 lambda 8 { 12 E 15 EL 19	r2
36	0 a 4 = 6 lambda 8 { 12 EL 14	s18
37	0 a 4 = 6 lambda 8 { 12 EL 14 } 18	r5
38	0 a 4 = 6 T 7	s11
39	0 a 4 = 6 T 7 ; 11	r4
40	0 E 3	r3
41	0 EL 2	r3
42	0 S 1	acc

Problem 3

1.

$E0 = \{\text{num} \rightarrow \text{int}\}$
 $E1 = E0 + \{\text{isPrime} \rightarrow \text{int}\}$
 $E2 = E1 + \{\text{x} \rightarrow \text{int}, \text{limit} \rightarrow \text{int}\}$
 $E3 = E2 + \{\text{flag} \rightarrow \text{int}\}$
 $E4 = E1$
 $E5 = E4 + \{\text{halfNum} \rightarrow \text{int}\}$
 $E6 = E1$

2.

2: E0
5: E2
8: E3
15: E1/E4
21: E5
24: E1/E4