

Midsem 2021

PSM-1

Q1: Order the tools given in the dropdown list as per their use in the timeline for a normal compilation and normal execution of a C-program. Note that some processes are NOT needed. Order from the first-used (step 1) to the last-used (step 5).

NOTE THAT AUTOGRADER CANNOT GRADE THIS QUESTION PROPERLY. PLEASE VERIFY THE SOLUTIONS MANUALLY.

Answer

1. Preprocessor
2. Compiler
3. Assembler
4. Linker
5. Loader

Other options were distractors.

Partial marking allowed. 0.5 marks for each correct item in the correct relative position. For example,
Compiler, Assembler, <all wrong choices> will fetch 1 mark; but
Assembler, Compiler, <wrong choices> will fetch ZERO marks.

Q2: Match the given regular expressions over alphabet $\{x, y\}$ on the LHS with an equivalent regular expression from the dropdown. Note that **0 matches** or **more than 1 matches** are also possible. If there are 0 matches, choose **NONE**. If there are more than 1 matches, choose **any ONE of the correct matches**.

NOTE THAT AUTOGRADER HAS MESSED UP. PLEASE VERIFY THE SOLUTIONS MANUALLY.

Answer

$(x + y)^*xy(x + y)^* + x^*y^*$	NONE
$(xy)^*x$	$x(yx)^*$
$(x + y)^*x(x + y)^*y(x + y)$	NONE // fixed
$(x + y)^*y(x + y)^*x$	NONE

Partial marking allowed. **1 mark for each correct match.**

Q3: autograded

Q4: autograded

Q5: autograded

Q6:

Explain with an example, why the following Lex pattern which is supposed to represent a comment is **incorrect**:

```
"/*" [^*] * (\* ( [^/ ] [^*] * ) ? ) * "*" /
```

Answer:

The expression will match `/***/*/` as a comment. To understand, “tokenize” the regexp:

```
"/*" [^*] * (\* ( [^/ ] [^*] * ) ? ) * "*" /
```

```
/*      *      *      /      */
```

In general, it will match multiple occurrences of `*/` in an input due to maximal munching.

Partial Marks: None.

Q7: autograded

PSM-2

Q1:

Consider the ambiguous grammar with Non-terminals $\{S, A\}$ and terminals as $\{+, x\}$:

$S \rightarrow + S \mid S + A \mid A$

$A \rightarrow x$

Assuming unary $+$ has **lower** precedence than the binary $+$, rewrite the grammar to make it unambiguous.

Answer:

$S \rightarrow + S \mid B$

$B \rightarrow B + A \mid A$

$A \rightarrow x$

(Other solutions possible)

Q2:

Consider the ambiguous grammar with Non-terminals $\{S, A\}$ and terminals as $\{+, x\}$:

$S \rightarrow + S \mid S + A \mid A$

$A \rightarrow x$

Assuming unary $+$ has **higher** precedence than the binary $+$, rewrite the grammar to make it unambiguous.

Answer:

$S \rightarrow S + A \mid B$

$B \rightarrow + B \mid A$

$A \rightarrow x$

(Other solutions possible)

Q3: autograded

Q4: autograded

Q5: autograded

Q6: autograded

Q7: autograded

PSM-3

1. $A \rightarrow B C D$

2. $B \rightarrow b B$

3. $C \rightarrow C g$

4. $C \rightarrow g$

5. $C \rightarrow C h$

6. $C \rightarrow i$

7. $C \rightarrow \epsilon$

8. $D \rightarrow A B$

9. $D \rightarrow \epsilon$

$\{g, h\}$

$\{i\}$

$\{\epsilon, g, h, i\}$

$\{g, h, i\}$