

## Section 1: Regular Expressions

Regular Expression Reference Table

Symbol	Meaning	Example(s)
$a$	Literal character	$a$ , any symbol in your alphabet $\Sigma$
$ab$	Concatenation of regex's (or literal characters) $a$ and $b$	$ab$ , $(abc)(def)$
$\epsilon$	Empty string	$\epsilon$
$a \mid b$	$a$ or $b$	$a, b$
$a^*$	0 or more $a$ 's	$\epsilon, a, aaaa, aaaaa$
$a^+$	1 or more $a$ 's: $aa^*$	$a, aaa, aaaaa$
$a?$	0 or 1 $a$ 's: $(a \epsilon)$	$\epsilon, a$
$[a-z]$	1 character in range $a-z$ : $(a \mid b \mid \dots \mid z)$	$a, b, c, d, e, f, \dots, z$
$[skj]$	1 of characters in bracket: $(s \mid k \mid j)$	$s, k, j$

1) Describe the meaning of each of the following regular expressions in English and give two different strings it can produce:

- i)  $(1 \mid 0)^* 0$
- ii)  $([A-Z][a-z]^* \mid [0-9]^+)$
- iii)  $(\epsilon \mid 4?0+1^* X 3^+)$

2) Write a regular expression for each of the following specifications:

- i) All strings consisting of 0's and 1's (binary digits) with an even number of 0s
- ii) camelCase variable name in Java, where the alphabet contains is upper and lower-case letters no digits or underscores
- iii) Non-empty strings of binary digits where each 1 directly follows a 0 (challenge: only use symbols in table up until \*)