Assignment #3
Date Due: March 16, 2018
Total: 100 marks

1. (10 marks each) Describe in English, as simple as possible, the languages generated by the following regular expressions:

   (a) $(a + b^*)^* aa^*$

   (b) $(b + a^*)^* b(b^*)^*$

   (c) $(bb + \epsilon)(aabb)^*(aa + \varepsilon)$

   (d) $b^* ab^* (b^* ab^* ab^* ab^* ab^* ab^*)^*$.

2. (25 marks) Prove that the following languages are regular languages:

   (a) $\{a^n b^m a^k \mid n \geq 2, m \geq 2, k \geq 1\}$

   (b) $\{a^n \mid n \neq 2 \text{ and } n \not\equiv 3(\mod 6)\}$

   (c) $\{a^n b \mid n \geq 3\} \cup \{ab^m \mid m \geq 1\}$

3. (25 marks) Prove that the following languages are not regular:

   (a) $\{c^m b^n a^n \mid n > 1, m \geq 0\}$

   (b) $\{ca^n b^{n+k+1} a^k \mid n > 0, n > k > 1\}$

   (c) $L = \{c^m a^n b^l \mid n \neq l, m > 2\}$

4. (10 marks) Is the following language regular or not?

$$\{a^n b^l a^m \mid |n - m| \leq 1, l > 2\}.$$