

# COMP 330 Winter 2021 Quiz 3 Solutions

Prakash Panangaden

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**Question 1:** Which is the only true statement of the following?

1. Context-free languages have to be finite.
2. Every regular language is context-free.
3. A language cannot be both regular and context-free.
4. Every language is either regular or context-free.
5. Every context-free language is regular.

**Answer 2.**

**Question 2:** What type of language is  $\{a^n b^n | n \geq 0\}$  over the alphabet  $\{a, b\}$ ?

1. Regular but not context free.
2. Neither regular nor context free.
3. Both regular and context-free.
4. It is not a language.
5. Context-free but not regular.

**Answer 5.**

**Question 3:** What is the only false statement among the following?

1. The language  $\{a^n b^n c^n | n \geq 0\}$  is not context-free.
2. Any finite language is context free.

3. The intersection of a context-free language and a regular language is always context-free.
4. The intersection of two context-free languages can never be context free.
5. The intersection of two context-free languages may not be context free.

**Answer 4.**

**Question 4:** The language  $\{a^{i+j}b^{j+k}c^{k+l}d^{i+l} \mid i, j, k, l \geq 0\}$  over the alphabet  $\{a, b, c, d\}$  is

1. not properly defined.
2. regular.
3. finite.
4. context-free but not regular.
5. neither context-free nor regular.

**Answer 4.**

**Question 5:** Which is the only true statement among the following?

1. A context-free language cannot contain a subset that is regular.
2. There are some context-free languages that contain no infinite regular subsets.
3. A context-free language must contain an infinite regular subset.
4. A context-free language cannot contain a finite subset.
5. A regular language cannot contain a subset that is context free.

**Answer 2.**