CSC 303 Teamwork T08

| Teamworks in this course are to be done collaboratively. In teams, it is important to make sure that everyone is contributing to and benefiting from the discussion. Brainstorming and debating ideas with other students is an excellent way to You are welcome to consult the professor, your teammates, the textbook, and other online resources (***not*** including ones that provide solutions to our specific problems) to complete any teamwork, but you *must* explicitly acknowledge any sources besides the professor, your teammates, and the textbook in the *Acknowledgements* section at the end of the document. |
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This teamwork covers material from Chapter 4, Section(s) 4.1, 4.2 from [**the textbook**](https://moodle.berea.edu/pluginfile.php/737252/mod_resource/content/1/Sipser_Introduction.to.the.Theory.of.Computation.3E.pdf).

1. Let X be the set {1, 2, 3, 4, 5} and Y be the set {6, 7, 8, 9, 10}. We describe the functions f: X→Y and g: X→Y in the following tables. Answer each part and give a reason for each negative answer.

| **n** | **f(n)** |  | **n** | **g(n)** |
| --- | --- | --- | --- | --- |
| 1 | 6 |  | 1 | 10 |
| 2 | 7 |  | 2 | 9 |
| 3 | 6 |  | 3 | 8 |
| 4 | 7 |  | 4 | 7 |
| 5 | 6 |  | 5 | 6 |

* 1. Is f one-to-one?
  2. Is f onto?
  3. Is f a correspondence?
  4. Is g one-to-one?
  5. Is g onto?
  6. Is g a correspondence?

1. Let T = { (i, j, k) | i, j, k ∈ N }. Show that T is countable. **HINT**: Does diagonalization only work on two-dimensional grids?
2. Let AεCFG = { ⟨G⟩ | G is a CFG that generates ε }. Show that AεCFG is decidable.
3. Let INFINITEPDA = { ⟨M⟩ | M is a PDA and L(M) is an infinite language }. Show that INFINITEPDA is decidable.

| **Acknowledgements:** |
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