Quiz 3

First: ☐ **LAST:** ☐ **Seat:** ☐ **Row:** ☐

1. A **PDA** $M = (Q, \Sigma, \Gamma, \delta, q_0, F)$ has $|Q| = 10$ states and $|\Sigma| = 2$ characters in the input alphabet and $|\Gamma| = 5$ characters in the tape alphabet. Then there are ☐ points in the domain of δ and ☐ points in the range of δ.

2. State the **Church-Turing thesis**:

3. Let A and B be languages. Define $A \leq_{\mathrm{m}} B$ (A **many-one reduces** to B):

4. When we define the language $A_{\mathrm{TM}} = \{\langle M, w\rangle : \text{ TM } M \text{ accepts } w\}$, what is the purpose of the **angle brackets** (the $\langle\ \rangle$ symbols) that surround M, w?

5. **Darken** the **correct** box. No justification is required. If you're not sure, guess.

   (a) **True** **False** If L is recursive then so is its complement, $\overline{L}$.

   (b) **True** **False** If L^* is recursive than L is recursive.

   (c) **True** **False** If L is context free then a queue automata (QA) can decide it.

   (d) **True** **False** The r.e. languages are closed under complement.

   (e) **True** **False** $L = \{\langle M\rangle :\ L(M) \neq \emptyset\}$ is Turing-acceptable (r.e.)

   (f) **True** **False** $L = \{a^n b^n :\ n \geq 1\}$ is co-r.e.

   (g) **True** **False** If $\Pi \leq_{\mathrm{m}} L$ and Π is undecidable than L is undecidable.

   (h) **True** **False** To show that L is not r.e., it suffice to show that $A_{\mathrm{TM}} \leq_{\mathrm{m}} L$.

   (i) **True** **False** To show that L is not r.e., it suffice to show that $\overline{A_{\mathrm{TM}}} \leq_{\mathrm{m}} L$.

   (j) **True** **False** A language L is either r.e. or co-r.e..

   (k) **True** **False** The Turing-acceptable languages are closed under intersection.

   (l) **True** **False** The Turing-acceptable languages are closed under set difference.