This is a “true-false”-answer quiz, so that we have more time to review for Midterm I in class today and so this quiz can with luck be graded and returned to you this same class session, so you have it back, graded, while you are studying for Midterm I. You can put scrap work on the bottom of this page or the back, but we’ll grade each problem all or nothing, \( \lceil \frac{100}{14} \rceil = 8 \) points each (so it is possible to get 112/100 on this quiz; it will not be scaled down from 112 to 100), based on whether you give the correct (True or False; do make sure to write out the entire word, not just T or F) answer on the given answer line.

Important Note: For the purposes of this quiz, take it that all our classes and problems (including HP) are over the alphabet \( \{0,1\} \).

**Question 1.** (True or False) There exists a set that has no infinite r.e. subsets and that at each length \( n \), \( n \geq 0 \), has exactly \( n + 1 \) elements.

**Question 2.** (True or False) HP has an infinite recursive subset.

**Question 3.** (True or False) \( \{ i \mid M_i \text{ accepts some string within 486 steps} \} \) is in \( \Pi_1 \).

**Question 4.** (True or False) There exists a set that has no infinite r.e. subsets and that at each length \( n \), \( n \geq 0 \), has exactly \( 2^n - 2 \) elements.

**Question 5.** (True or False) \( \overline{HP} \) has an infinite co-r.e. subset.

**Question 6.** (True or False) One of the two Rice theorems we learned applies directly to this set: \( \{ i \mid L(M_i) = HP \} \).

**Question 7.** (True or False) \( L \) is enumerated in order, from smallest things onward without repetitions only if \( L \) is recursive.

**Question 8.** (True or False) One of the two Rice theorems we learned applies directly to this set: \( \{ (i, j) \mid L(M_i) \neq L(M_j) \} \).

**Question 9.** (True or False) There are exactly two recursive sets that are not \( \Sigma_0 \)-complete with respect to recursive many-one reductions.

**Question 10.** (True or False) \( \{ i \mid M_i \text{ is a total Turing machine} \} \) is in \( \Sigma_2 \).

**Question 11.** (True or False) For every problem \( A \) in \( \Sigma_1 \) there exists some problem \( B \) in \( \Pi_1 \) such that \( A \) recursively many-one reduces to \( B \).

**Question 12.** (True or False) There are exactly two recursive sets that are not \( \Sigma_1 \)-complete with respect to recursive many-one reductions.

**Question 13.** (True or False) \( \{ (i, j) \mid L(M_i) \neq L(M_j) \} \) is in \( \Sigma_2 \).

**Question 14.** (True or False) \( \Sigma_1 \cap \Pi_1 = \Pi_0 \).