Quiz #4, Due: 9/21
Math 181 (Discrete Structures), Fall 2022

Problem 1 is worth 4 points (1 pt each part), Problem 2 is worth 4 points (1 pt each part), and Problem 3 is worth 2 points, for a total of 10 points. Remember to *show your work* and *explain your answers* on all problems!

1. Let $P(x)$ denote the statement "x is a professional athlete" and $Q(x)$ the statement "x plays soccer." The domain of discourse is the set of all people. For each of the following: write the proposition in English, and determine if it is true or false.

   (a) $\forall x\ Q(x) \to P(x)$

   (b) $\forall x\ P(x) \vee Q(x)$

   (c) $\exists x\ \neg P(x) \wedge Q(x)$

   (d) $\exists x\ P(x) \wedge \neg Q(x)$

2. Let $P(x)$ denote the statement "x is a musician" and $Q(x)$ the statement "x plays piano." The domain of discourse is the set of all people. For each of the following: write the proposition symbolically, and determine if it is true or false.

   (a) Every musician plays piano.

   (b) Everyone who plays piano is a musician.

   (c) Some musician plays piano.

   (d) Someone who plays piano is a musician.

3. Write the saying "Not all those who wander are lost" symbolically as a quantified statement.