Week 2 Quiz: Objects and Classes

Here is a Tournament class that records game outcomes and reports statistics (statistics method omitted to save space).

class Tournament:
    """A sports tournament.

    === Attributes ===
    teams:
        The names of the teams in this tournament.
    team_stats:
        The history of each team in this tournament. Each key is a team name,
        and each value stores the number of games played and the number won.

    === Sample usage ===
    >>> t = Tournament(['a', 'b', 'c'])
    >>> t.record_game('a', 'b', 10, 4)
    >>> t.record_game('a', 'c', 5, 1)
    >>> t.record_game('b', 'c', 2, 0)
    >>> t.best_percentage()
    'a'
    """

    # Attribute types
    teams: List[str]
    team_stats: Dict[str, List[int]]

def __init__(self, teams: List[str]) -> None:
    """Initialize a new Tournament among the given teams.
    """
    self.team_stats = {}  # Line 1
    self.teams = []  # Line 2
    for team_name in teams:  # Line 3
        self.teams.append(team_name)  # Line 4
        self.team_stats[team_name] = [0, 0]  # Line 5

def record_game(self, team1: str, team2: str,
                 score1: int, score2: int) -> None:
    """Record the fact that <team1> played <team2> with the given scores.

    <team1> scored <score1> and <team2> scored <score2> in this game.

    Precondition: team1 and team2 are both in this tournament.
    """
1. Read the class and method docstrings.
   
   (a) Modify the example use given in the class docstring so that a *precondition* would be violated when a method is called. You can write your solution directly on the code.
   
   (b) Did you need to know about the instance attributes to do this?

2. Get familiar with the instance attributes. What value should \texttt{t.team_stats} have after executing the code in the example use shown in the class docstring?

3. Implement method \texttt{Tournament.record_game}. There is room to write your solution directly on the previous page.

4. Read the \texttt{Tournament} initializer method. Lines 2, 3 and 4 create and assign an initial value to attribute \texttt{teams}. Would it make any difference if instead we simply wrote \texttt{self.teams = teams} instead? Explain.
   
   (We've left you lots of space to draw a memory model diagram, in case that might help!)