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# **Bridge - Scoring and Putting it all Together**

WARNING: For the purposes of Academic Integrity, the final project is treated like a final exam. This means penalties are increased for any academic offences (including, but not limited to receiving 0 in the entire course!) You have been warned.

**Reminder:** Do not discuss this assignment with anyone except the instructors on the EdX discussion forums!

# Scoring

Scoring is done when a hand is fully played. We will use duplicate bridge scoring here. The following is adapted from the Wikipedia page on Bridge Scoring found here

Remember that games without an all-passed contract establish a **declarer** (see previous questions for more information). The Contract contains numeric information as well as the trump suit that was established over the course of the game. The numeric portion of the bid plus 6 signals how many **tricks** the declarer's team believes they can get (note by adding 6, whenever a team makes a numeric bid it means that they believe they will get the majority of the tricks since there are only 13 tricks total in a round of Bridge). If contracts are doubled or redoubled, this (roughly) doubles or quadruples the points in the round (see below for more specific details).

Assuming the declaring team made or exceeded their contract

If the declaring team made or exceeded their contract, they receive points according to the following. First, there are suit bonuses for their contract. **Major suits** are spades and hearts and **minor suits** are clubs and diamonds.

### **Contract Points**

The following table summarizes points you get for making your contract.

Suit	Points per trick after the 6th trick
Minor Suits	20
Major Suits	30
No Trump	40 for first trick and 30 for each trick afterwards

In the above table, the values are doubled if the contract was doubled and are quadrupled if the contract was redoubled. For example, a contract of 3NT that was redoubled would obtain (40 + 30 + 30)\*4 = 400 points (plus other scoring below) if the declaring team obtained exactly 9 tricks. A contract of 1S would obtain 30 points here (plus other scoring below) if the declaring team took exactly 7 tricks. Vulnerability does not play a role in the above table. 60813

### **Game Bonus**

If a declaring team scores strictly less than 100 points in the above contract points section, they score an additional 50 points (for example, the 1S contract above would score an additional 50 points on top of the 30). If however, the declaring team scores 100 or more points in the above criteria, they score an additional 300 points if the declaring team is not vulnerable and 500 points if the declaring team is vulnerable (so if not vulnerable, the 3NT contract scores 100 + 300 = 400 points total).

# **Overtrick Points**

A declaring team is also rewarded for taking tricks in addition to their contract. If the contract is not doubled or redoubled, then each overtrick in a major suit or no trump contract is worth 30 points and each overtrick in a minor suit contract is worth 20 points.

If however, the contract is doubled or redoubled, follow the overtrick point scoring system below

	Declarer is Not Vulnerable	Declarer is Vulnerable		
Doubled	100	200		
Redoubled	200	400		

As an example, if the declaring team is in a 4S contract non-vulnerable and makes 11 tricks they receive 30 extra points for the single overtrick bonus (recall that 4S would imply that the declarer should make 10 tricks; the previous section shows this scored 120 points and the overtrick gives an extra 30).

If that same 4S contract was vulnerable and redoubled however, that extra 11th trick would be worth 400 points!

# Doubled/Redoubled Contract Made Bonus

When a doubled or redoubled contract is made, the declaring team also gets bonus points. If a doubled contract is made, the declaring team scores an additional 50 points. If a redoubled contract is made, the declaring team scores an additional 100 points.

#### Slam Bonuses

If a team has a contract in the 6 or 7 level and makes them, there are **small** slam and grand slam bonuses that are awarded. A contract of 6 in any suit (or no trump) that is made is called a **small slam**. A contract of 7 in any suit (or no trump) that is made is called a **grand slam**. The following table gives the bonuses for these which depend on the declarer's vulnerability:

	Declarer is Not Vulnerable	Declarer is Vulnerable		
Small Slam	500	750		
Grand Slam	1000	1500		

# Assuming the declaring team does not make their contract

If a team does not make their contract, the non-declaring team (also called the **defending team**) receives penalty points. These penality points are based on how many **undertricks**, or tricks that the declaring team was missing to obtain their contract as well as whether or not the contract was doubled or redoubled and also on the vulnerability of the declaring team. As an example,

if a declaring team in a 3NT contract only made 8 tricks, there is one undertrick obtained by the defending team (this is also worded as the contract is "down 1"). The following table highlights all the situations

	Points Per Undertrick							
Number of Undertricks	Not Vulnerable			Vulnerable				
	Undoubled	Doubled	Redoubled	Undoubled	Doubled	Redoubled		
First Undertrick	50	100	200	100	200	400		
Second and Third Undertricks	50	200	400	100	300	600		
Fourth or more Undertricks	50	300	600	100	300	600		

In this final part, you will write a function

which consumes a Game object (as defined in the previous question) and returns the score obtained. The score should be positive if the declaring team makes or exceeds their contract and negative if the declaring team does not make their contract.

Warning! There are a lot of cases to consider for this problem so while the body of this function might be relatively straightforward, there is lots of room for error and testing your code well will be extremely important!

Here is a handy site for calculating scores for you to test: Counting Points at <u>Bridge</u>

Last submission on 04-08-2021 00:49:57 Result: Could not find test results

```
🔁 - Add File
main.py
     from a10q3 import *
    import check
  5 def score(bridge_game):
```

```
6
      Returns the score of a bridge game.
7
      score: Game -> Int
9
10
      Examples:
11
          P = [Player("North", []), Player("East", []),
12
               Player("South", []), Player("West", [])]
13
         G = Game([Bid("3", "NT"), None], "South",
14
              "North", 9, P, False, False)
15
          score(G) => 400
16
17
         G = Game([Bid("4", "S"), None], "South",
18
              "North", 11, P, False, True)
19
          score(G) \Rightarrow 450
20
21
          G = Game([Bid("4", "S"), Bid("double", None)],
22
                   "South", "North", 9, P, True, False)
23
          score(G) \Rightarrow -200
24
25
      ##YOUR CODE GOES HERE
26
      pass
27
28
29
    ##Examples for score
30
    P = [Player("North", []), Player("East", []), Player("South", []),
31
         Player("West", [])]
32
    G = Game([Bid("3", "NT"), None], "South",
33
         "North", 9, P, False, False)
34
    check.expect("Example 1", score(G), 400)
35
36
    G = Game([Bid("4", "S"), None], "South",
37
         "North", 11, P, False, True)
38
    check.expect("Example 2", score(G), 450)
39
40
    G = Game([Bid("4", "S"), Bid("double", None)], "South",
41
         "North", 9, P, True, False)
42
    check.expect("Example 3", score(G), -200)
43
44
45
    ##To see the whole game in action, uncomment this to play!
46
    ##print(score(play_game_bootstrap()))
```

## Code Output