Name: _____

1. (1 pt.)

   ○ **Read all material carefully.**
   ○ This test is **closed book, closed notes**.
   ○ However, you may refer to **one** standard Letter-sized sheet of paper (both sides) that has **notes hand-written by you**. If used, this sheet of notes must **include your name** near the top and must be **submitted** along with the quiz.
   ○ Computing or communication devices of any kind (laptop computers, tablets, phones, calculators, etc.) are not permitted.
   ○ Network access of any kind (cell, voice, text, data, etc.) is not permitted.
   ○ Write, and draw, carefully. Ambiguous or cryptic answers receive zero credit.
   ○ Use class and textbook conventions for notation, algorithmic options, etc.

   Write your name in the space provided above.
   Do not write anything else on this page.

   WAIT UNTIL INSTRUCTED TO CONTINUE TO REMAINING QUESTIONS.
   (Do not view any other pages.)

1

Q	Full Score
1	1
2	9
3	10
4	10
total	30

2. (9 pts.) Prove or disprove: Every binary tree with n vertices, with $n > 1$, has an edge whose removal results in splitting the tree into trees A and B with sizes (number of vertices) $|A|$ and $|B|$, such that $|A| \leq 2n/3$ and $|B| \leq 2n/3$.

3. (10 pts.) Using the textbook's conventions, provide detailed pseudocode that corresponds to the Python code below as closely as possible. [Reminder: Present your code (especially indentation) very clearly.]

```
def f101(n):
    r = 0
    for i in range(n):
        for j in range(2 * i, i * i):
            r += 1
    return r
```

4. (10 pts.) What is the value of `f101(6)` where the function `f101` is defined by the Python code of Question 3? Provide an exact numerical answer. Explain your answer.

[additional space for earlier material]

[additional space for earlier material]