
GP - GEB Problem Set: The pq- System

What's It All About?

This problem set is based on Chapter 2 of Hofstadter's GEB. In it he presents the first of his Post productions systems that have a numeric flavor. The sequence of production systems that Hofstadter presents, particularly the numeric flavored systems, pave the way for his discussion of Godel's theorem.

Task

Craft a nicely formatted document consisting of both the questions that you see below, and, immediately following each question, your answer to the question. Please format your work on this problem set in just the same way that you were asked to format the MIU System problem set. And, as always, please save your document as a **pdf** file.

1. What is the formal system of Chapter 2 called?
2. What are the distinct symbols of this formal system?
3. How many axioms in the pq- system?
4. Write down the *axiom schema* for the pq- system.
5. Write down the three shortest axioms in the pq- system.
6. Write down the sole rule of production for the pq- system.
7. Show that $--p---q-----$ is a theorem of the pq- system. That is, derive it from an axiom and repeated application of the rule.
8. Show that $-----p-----q-----$ is a theorem of the pq- system. That is, derive it from an axiom and repeated application of the rule.
9. Write down a string of symbols in the pq- system which is *not* well formed.
10. State a *decision procedure* for the pq- system.
11. In the longest paragraph on page 48, Hofstadter engages in some "top-down" reasoning. In one sentence, articulate exactly what it is that he demonstrates with his top-down reasoning in this paragraph?
12. In one sentence, characterize "top-down" reasoning.
13. In one sentence, characterize "bottom-up" reasoning.
14. Consider the procedure for generating theorems of the pq- system given at the top of page 49. What will be in the bucket after executing statement (1a)? After (1b)? After (2a)? After (2b)? After (3a)? After (3b)?
15. What role does the procedure introduced on the top of page 49 play in Hofstadter's presentation of the pq- system and related matters? Answer in just one sentence!
16. What is an *isomorphism*?
17. What is an *interpretation* in the context of a formal system?
18. When was Linear B deciphered?
19. How many *meaningful* interpretations of the pq- system did Hofstadter present in this chapter.

20. How many *meaningless* presentations of the pq- system are there?
21. In 50 plus or minus 20 words, summarize what Hofstadter says in the section titled “Formal Systems and Reality”.

Further Instructions

As previously mentioned, please save your document as a **pdf** file. Only files in the **pdf** format will be accepted. Then, please respond to my email soliciting your work with respect to this assignment, just one time, being sure to attach your **pdf** file. **Please note: This is not an email for you to respond to with questions or comments. Just the pdf file containing your work with respect to this assignment.**

Due date

Friday, February 11, 2022. Any time of the day will due.