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The Questions

1. What is the formal system of Chapter 2 called?

The pq-System.

2. What are the distinct symbols of this formal system?

P, q, and -.

3. How many axioms in the pq- system?

There are an infinite number of axioms.

4. Write down the axiom schema for the pq- system.

The axiom schema manufactures axioms that meet the addition criteria.

5. Write down the three shortest axioms in the pq- system.

-p-q--, --p--q----,--p---q-----

6. Write down the sole rule of production for the pq- system.

Suppose x,y, and z all stand for particular things containing only hyphens. And suppose that xpyqz is known to be a theorem. Then xpy-Qz- is a theorem.

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.

--p---q----- is a theorem because 2+3=5

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.

-----p----q--------- is a theorem because 5+4=9.

9. Write down a string of symbols in the pq- system which is not well formed.

--p--p--p—q--------

10. State a decision procedure for the pq- system.

The first two hyphen-groups should add up, in length to the third hyphen group.

11. In the longest paragraph on page 48, Hofstadter engages in some "top-down" reasoning. In one sentence, articulate exactly what it is is that he demonstrates with his top-down reasoning in this paragraph?

Within this example of a formal system, its less interesting to scholars because of its inability to possess shortening rules, only lengthening rules.

12. In one sentence, characterize "top-down" reasoning.

Working the way back down from the basics.

13. In one sentence, characterize "bottom-up" reasoning.

Working the way up from the basics.

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)?

-p-q--, -p--q---, --p--q----.

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!

The role of the procedure is to better simplify the complications that the axiom schema have on the system.

16. What is an isomorphism?

An information preserving transformation.

17. What is an interpretation in the context of a formal system?

When two complex structures can be mapped onto each other, so that each part corresponds (plays a similar role) to each other.

18. When was Linear B deciphered?

1952

19. How many meaningful interpretations of the pq- system did Hofstadter present in this chapter.

2.

20. How many meaningless presentations of the pq- system are there?

3(?)

21. In 50 plus or minus 20 words, summarize what Hofstadter says in the section titled "Formal Systems and Reality".

In reality, formal systems are completely independent of whatever's space in time they occupy. They are two different things. However, with this independence, they can also overlap, one could potentially mimic the other. The rules of the fabric of reality that have been here since the beginning may not accurately be accurate in our current reality.