A Proof from PROTEIN*

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Abstract

This is just an experiment.

Axiom 0.1 $p(A) \vee p(f^2(A))$.

Theorem 0.1 $\exists\ x_1\ (p(x_1) \wedge p(f(x_1)))$.

Proof[1]. We show directly that

$$\exists\ x_1\ (p(x_1) \wedge p(f(x_1))). \tag{1}$$

Let us consider an arbitrary v_1.
We show that we can assume

$$\neg\ p(f^2(v_1)), \tag{2}$$

since we can complete the proof otherwise.
Let us assume that

$$p(f^2(v_1)). \tag{3}$$

Hence

$$p(f^2(v_1)). \tag{4}$$

We show that we can assume

$$\neg\ p(f(v_1)), \tag{5}$$

since we can complete the proof otherwise.

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[1] PROTEIN

Let us assume that $p(f(v_1))$. Hence $p(f(v_1))$. By (3) $p(f^2(v_1))$. Therefore we are done with the solution $f(v_1)$.
Now we confine ourselves to the case (5). Hence by Axiom 0.1 $p(f^3(v_1))$. Hence by (4) we are done with the solution $f^2(v_1)$.
Now we confine ourselves to the case (2). Hence by Axiom 0.1

$$p(v_1). \tag{6}$$

We show that we can assume

$$\neg\ p(f^3(v_1)), \tag{7}$$

since we can complete the proof otherwise.
Let us assume that

$$p(f^3(v_1)). \tag{8}$$

Hence

$$p(f^3(v_1)). \tag{9}$$

We show that we can assume

$$\neg\ p(f^2(v_1)), \tag{10}$$

since we can complete the proof otherwise.
Let us assume that $p(f^2(v_1))$. Hence $p(f^2(v_1))$. By (8) $p(f^3(v_1))$. Therefore we are done with the solution $f^2(v_1)$.
Now we confine ourselves to the case (10). Hence by Axiom 0.1 $p(f^4(v_1))$. Hence by (9) we are done with the solution $f^3(v_1)$.
Now we confine ourselves to the case (7). Hence by Axiom 0.1 $p(f(v_1))$. Hence by (6) we are done with the solution v_1. This completes the proof of (1).

q.e.d.