

# HW 11 (MATH 2510)

$$\begin{aligned} \textcircled{1} \quad \text{Ack}(1,2) &= \text{Ack}(0, \text{Ack}(1,1)) \\ &= \text{Ack}(0, \text{Ack}(0, \text{Ack}(1,0))) \\ &= \text{Ack}(0, \text{Ack}(0, 1)) \\ &= \text{Ack}(0, 1) \\ &= 1+1 \\ &= 2 \\ &= \text{Ack}(0,2) \\ &= 2+1 \\ &= 3 \end{aligned}$$

$$\textcircled{2} \quad x(n+1) = (n+1)x(n); x(0) = 3$$

$$x(0) = 3 \downarrow$$

$$n=0: x(1) = 1x(0) = 3$$

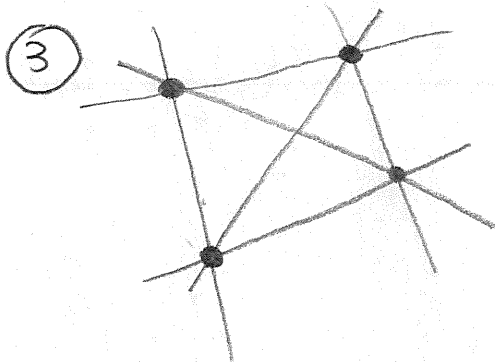
$$n=1: x(2) = 2x(1) = 2(3) = 6$$

$$n=2: x(3) = 3x(2) = 3(6) = 18$$

$$n=3: x(4) = 4x(3) = 4(18) = 72$$

$$n=4: x(5) = 5x(4) = 5(72) = 360$$

General formula:  $x(n) = 3 \cdot (n!)$

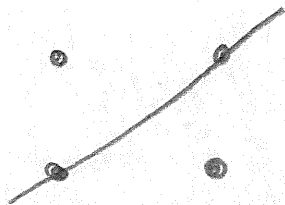


4



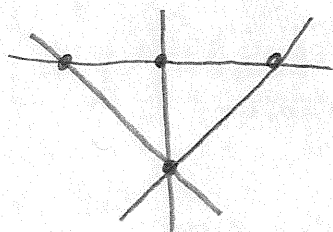
Axioms 2+3 hold, but not Axiom 1

5



Axioms 1 and 3 hold, but not Axiom 2

6



Axioms 1 and 2 hold, but not Axiom 3

Formula

Gödel Number

8

$$S_0 \cdot S_0 = 0$$

$$2^2 3^3 4^2 2^3 5^5 3^3 = g_1$$

$$S_0 \cdot S S_0 = (S_0 \cdot S_0) + S_0$$

$$\left\{ \begin{array}{l} 2^2 3^3 5^4 7^2 11^2 13^3 17^5 19^6 23^2 29^3 31^4 \\ 37^2 41^3 43^7 47^8 53^2 59^3 \end{array} \right\} = g_2$$

$$S_0 \cdot S S_0 = S_0 + S_0$$

$$\rightarrow 2^2 3^3 5^4 7^2 11^2 13^3 17^5 19^2 23^3 29^8 31^2 37^3 = g_3$$

9

$$2^{g_1} 3^{g_2} 5^{g_3}$$