

Exam #1, extra credit problems

① Define

$$0 =_{df} \{A : \sim \exists x (x \in A)\}$$

$$1 =_{df} \{A : \exists_1 x (x \in A)\}$$

$$2 =_{df} \{A : \exists_2 x (x \in A)\}, \text{ etc}$$

and where  $m$  and  $n$  are numbers:

$$m+n =_{df} \left\{ C : \exists A B \left( \begin{array}{l} A \in m \ \& \ B \in n \ \& \\ A \cap B = \emptyset \ \& \\ C = A \cup B \end{array} \right) \right\}$$

Show:

$$(a) \ 1 + 0 = 1$$

$$(b) \ 1 + 1 = 2$$

② Show:

$$a = b \equiv \forall A (a \in A \equiv b \in A)$$

10/1, (2)

(3) Explain how our unrestricted abstraction principles lead to a contradiction — "Russell's paradox." How would you modify these principles to avoid Russell's paradox?