# Contents

**1 Philosopherers** **3**

**2 First Chapter** **5**

# Chapter 1

# Philosopherers

$OrderTrichotomy(<, S) := \forall_{x,y \in S}(x < y \veebar x = y \veebar y < x)$
$OrderTransitivity(<, S) := \forall_{x,y,z \in S}\big((x < y \wedge y < z) \implies x < z\big)$
$Order(<, S) := OrderTrichotomy(<, S) \wedge OrderTransitivity(<, S)$
$BoundedAbove(E, S, <) := Order(<, S) \wedge E \subset S \wedge \exists_{\beta \in S}\forall_{x \in E}(x \leq \beta)$
$BoundedBelow(E, S, <) := Order(<, S) \wedge E \subset S \wedge \exists_{\beta \in S}\forall_{x \in E}(\beta \leq x)$
$UpperBound(\beta, E, S, <) := BoundedAbove(E, S, <) \wedge \beta \in S \wedge \forall_{x \in E}(x \leq \beta)$
$LowerBound(\beta, E, S, <) := BoundedBelow(E, S, <) \wedge \beta \in S \wedge \forall_{x \in E}(\beta \leq x)$
$LUB(\alpha, E, S, <) := UpperBound(\alpha, E, S, <) \wedge \forall_{\gamma}\big(\gamma < \alpha \implies \neg UpperBound(\gamma, E, S, <)\big)$
$GLB(\alpha, E, S, <) := LowerBound(\alpha, E, S, <) \wedge \forall_{\beta}\big(\alpha < \beta \implies \neg LowerBound(\beta, E, S, <)\big)$
$LUBProperty(S, <) := \forall_{E}\Big(\big(\emptyset \neq E \subset S \wedge BoundedAbove(E, S, <)\big) \implies \exists_{\alpha \in S}\big(LUB(\alpha, E, S, <)\big)\Big)$
$GLBProperty(S, <) := \forall_{E}\Big(\big(\emptyset \neq E \subset S \wedge BoundedBelow(E, S, <)\big) \implies \exists_{\alpha \in S}\big(GLB(\alpha, E, S, <)\big)\Big)$
(LUBPropertyImpliesGLBProperty) $LUBProperty(S, <) \implies GLBProperty(S, <)$

1. $LUBProperty(S, <) \implies \ldots$
    1.1. $\forall_{E}\Big(\big(\emptyset \neq E \subset S \wedge BoundedAbove(E, S, <)\big) \implies \exists_{\alpha \in S}\big(LUB(\alpha, E, S, <)\big)\Big)$
    1.2. $(\emptyset \neq B \subset S \wedge BoundedBelow(B, S, <)) \implies \ldots$
        1.2.1. $|B| = 1 \implies \ldots$
            1.2.1.1. $\exists_{u'}(u' \in B)$ ▮ $u := choice(\{u' | u' \in B\})$ ▮ $B = \{u\}$
            1.2.1.2. $GLB(u, B, S, <)$ ▮ $\exists_{\beta_0 \in S}\big(GLB(\beta_0, B, S, <)\big)$
        1.2.2. $|B| = 1 \implies \exists_{\beta_0 \in S}\big(GLB(\beta_0, B, S, <)\big)$
        1.2.3. $|B| \neq 1 \implies \ldots$
            1.2.3.1. $L := \{s \in S | LowerBound(s, B, S, <)\}$
            1.2.3.2. $|B| > 1$ ▮ $\exists_{b_1' \in B}\exists_{b_0' \in B}(b_0' < b_1')$ ▮ $b_1 := choice\Big(\{b_1' \in B | \exists_{b_0' \in B}(b_0' < b_1')\}\Big)$
            1.2.3.3. $\neg LowerBound(b_1, B, S, <)$ ▮ $b_1 \notin L$ ▮ $L \subset S$
            1.2.3.4. $\exists_{\delta' \in S}\big(LowerBound(\delta', B, S, <)\big)$ ▮ $\delta := choice\Big(\delta' \in S | \big(LowerBound(\delta', B, S, <)\big)\Big)$
            1.2.3.5. $\delta \in L$ ▮ $\emptyset \neq L$
            1.2.3.6. $\emptyset \neq L \subset S$
            1.2.3.7. —-
            1.2.3.8. $\forall_{y \in L}\big(LowerBound(y, B, S, <)\big)$ ▮ $\forall_{y \in L}\big(BoundedBelow(E, S, <) \wedge y \in S \wedge \forall_{x \in E}(y \leq x)\big)$
        1.2.4. $|B| \neq 1 \implies \exists_{\beta_1 \in S}\big(GLB(\beta_1, B, S, <)\big)$
        1.2.5. $\Big(|B| = 1 \implies \exists_{\beta_0 \in S}\big(GLB(\beta_0, B, S, <)\big)\Big) \wedge \Big(|B| \neq 1 \implies \exists_{\beta_1 \in S}\big(GLB(\beta_1, B, S, <)\big)\Big)$
        1.2.6. $(|B| = 1 \vee |B| \neq 1) \implies \exists_{\beta \in S}\big(GLB(\beta, B, S, <)\big)$ ▮ $\exists_{\beta \in S}\big(GLB(\beta, B, S, <)\big)$
2. Fourth

# Chapter 2

# First Chapter

1. First
    1.1. Second
    1.2. Third
2. Fourth

This will be an empty chapter and I will put some text here

$$\sum_{i=0}^{\infty} a_i x^i \tag{2.1}$$

The equation 2.1 shows a sum that is divergent. This formula will later be used in the page **??**.
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