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A Propositional Probablistic Logic

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In contrast to logic, Probability theory is a tool to reason about uncertainty. However, when one wants to use rules of probability theory to reason about a problem, he needs to take advantage of logical deduction rules at the same time. We show that this combining is error prone by discussing two puzzling problems in probability theory: 1- Monty Hall Problem and 2- Two Children Problem. We show that the puzzles arise because of a wrong use of PEM (principle of excluded middle) in reasoning about the problems. Then to avoid the error in reasoning, we propose a propositional probablistic logic by introducing a deduction system and a sound and complete semantics for it.