Using a new Delta Function Representation, QFT Disconnected
Diagrams Evaluate to Zero KENNETH BRAND, United Technologies — When
evaluating Quantum Field Theory terms using diagram based perturbation expan-
sions (Feynman Diagrams), those diagrams that have subgraphs that are not con-
nected to incoming or outgoing particles are ignored. There are convincing physical
reasons why these particular diagrams should be ignored. However, when the numer-
ical value of a typical such term is evaluated, the calculated value is conventionally
divergent. In this paper, these disconnected diagrams are evaluated using a new
representation of the Dirac delta function. By constraining the choices of the delta
function representations, the value of any QFT disconnected diagram can be made
to be precisely zero. This approach gives a mathematical justification for ignoring
such terms without having to invoke infinite renormalization.