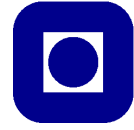


FY3464 Quantum Field Theory

NTNU

Problemset 12

Institutt for fysikk

Problem 1

Use Wick's theorem to prove that

$$\sum_{\sigma \in S_{n+m}} \exp[-i \sum_{j=1}^{n+m} k_j \cdot x_{\sigma(j)}] = \int \prod_{j=1}^{n+m} d^4 y_j \frac{k_j^2 - m^2 + i\epsilon}{i} e^{-ik_j y_j} \langle T \{ \phi(y_1) \dots \phi(y_{n+m}) \phi(x_1) \dots \phi(x_{n+m}) \} \rangle_{\text{free}} \quad (1)$$

holds in the case $n = m = 1$ under the assumption that $k_1 \neq -k_2$.