

**PHYSICS 428-2 QUANTUM FIELD THEORY II**

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Course Webpage: [http://www.hep.anl.gov/ian/teaching/QFTII/QFT\\_Winter09.html](http://www.hep.anl.gov/ian/teaching/QFTII/QFT_Winter09.html)*ASSIGNMENT #10*Due at 3 PM, March 16th

(One page and two problems.)

**Reading Assignments:**

Section 9.6 of Peskin and Schroeder.

**Problem 1**

Do Problem 9.2 of Peskin and Schroeder.

**Problem 2**

The two-point Green's function of a free scalar field is defined explicitly as

$$\langle 0|T(\phi(x)\phi(y))|0\rangle = \theta(x^0 - y^0)\langle 0|\phi(x)\phi(y)|0\rangle + \theta(y^0 - x^0)\langle 0|\phi(y)\phi(x)|0\rangle.$$

Show within canonical quantization that it satisfies the Schwinger-Dyson equation we derived in class using path integral approach:

$$(\partial_x^2 + m^2)\langle 0|T(\phi(x)\phi(y))|0\rangle = -i\delta^{(4)}(x - y).$$

What is the origin of the delta function on the right-hand side?