We have a scalar function $T(\theta, \phi)$ on a sphere. The function must be isotropic, so it depends only on θ. It turns out that the correlation function $T(\theta_1, \phi_1)T(\theta_2, \phi_2)$ can be expanded in Legendre Polynomials.

$$T(\theta_1, \phi_1)T(\theta_2, \phi_2) = \sum_{l=0}^{\infty} \frac{2l+1}{4\pi} C_l P_l(cos(\psi)) \tag{1}$$

where ψ is the angular separation of the two points on the sphere (angle between the two vectors pointing to (θ_1, ϕ_1) and (θ_2, ϕ_2)).

$$cos(\psi) = sin(\theta_1)sin(\theta_2)cos(\phi_1 - \phi_2) + cos(\theta_1)cos(\theta_2) \tag{2}$$

Now I want to calculate the power spectrum coeficients C_l.

$$C_l = \int_0^{\pi} T(\theta_1, \phi_1)T(\theta_2, \phi_2)P_l(cos(\psi))sin(\psi)\, d\psi. \tag{3}$$

I know I will have to change the variables and limits of the integration in some way to do it right...