1 Ring Function

Consider the normalized wavefunction $\Phi(\phi)$ for a quantum mechanical particle of mass μ constrained to move on a circle of radius r_0, given by:

$$\Phi(\phi) = \frac{N}{2 + \cos(3\phi)} \tag{1}$$

where N is the normalization constant.

(a) Find N.

(b) Plot this wave function.

(c) Plot the probability density.

(d) Find the probability that if you measured L_z you would get $3\hbar$.

(e) What is the expectation value of L_z in this state?