1 Sphere Table

(10 pts) Attached, you will find a table showing different representations of physical quantities associated with a quantum particle confined to a sphere. Fill in all of the missing entries. Hint: You may look ahead. We filled out a number of the entries throughout the table to give you hints about what the forms of the other entries might be. pdf link for the Table or doc link for the Table

2 QM Sphere with Time Dependence

(2,2,2,4,4 pts) Consider a quantum particle on a sphere. At t = 0, the particle is in state:

$$|\psi(t=0)\rangle = \frac{1}{\sqrt{2}}\left(|2,0\rangle + |1,0\rangle\right)$$

Calculate the following quantities for some later time, $t > 0$, and identify whether each quantity is time-dependent.

(a) $|\psi(t)\rangle$.

(b) $\langle L_z \rangle$

(c) $\mathcal{P}(L^2 = 6\hbar^2)$

(d) The probability that the particle can be found in the "southern" hemisphere.

(e) The probability that the particle can still (at the time t) be found in the state

$$|\psi\rangle = \frac{1}{\sqrt{2}}\left(|2,0\rangle + |1,0\rangle\right)$$

3 Confidence Rating

(1 pt) After solving each problem on the assignment, indicate your answers to the following questions for each problem. Answer for the problem as a whole, even if the problem has multiple parts.

(a) **Question Confidence** How confident are you that you are interpreting the problem the way the instructor intends?

1	2	3	4	5	6	7
Not confident at all			Somewhat confident			Extremely confident

For the rest of the questions, assume you have interpreted the problem correctly

(b) **Problem Confidence** How confident are you that you could independently come up with a correct solution process to a similar problem on a future problem set?

1	2	3	4	5	6	7
Not confident at all			Somewhat confident			Extremely confident

(c) **Answer Confidence** How confident are you that your final answer to this question is correct (not solution process)?

1	2	3	4	5	6	7
Not confident at all			Somewhat confident			Extremely confident

(d) **Makes Sense** To what degree do you understand how your answer fits (or does not fit) the physical or mathematical situation of the problem?

VN	N	LN	IDK	LF	F	VF
Very confident answer does NOT fit	Somewhat confident answer does NOT fit	Leaning toward the answer does NOT fit	Don't know if answer fits or not	Leaning toward the answer fits	Somewhat confident the answer fits	Very confident answer fits