

CONFLICT OF INTEREST QUESTIONNAIRE

FORM CIQ

For vendor or other person doing business with local governmental entity

This questionnaire is being filed in accordance with chapter 176 of the Local Government Code by a person doing business with the governmental entity.

By law this questionnaire must be filed with the records administrator of the local government not later than the 7th business day after the date the person becomes aware of facts that require the statement to be filed. See Section 176.006, Local Government Code.

A person commits an offense if the person violates Section 176.006, Local Government Code. An offense under this section is a Class C misdemeanor.

OFFICE USE ONLY

Date Received

RECEIVED

MAY 10 2007

BY: CH

1 Name of person doing business with local governmental entity.

Woodforest National Bank

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Check this box if you are filing an update to a previously filed questionnaire.

(The law requires that you file an updated completed questionnaire with the appropriate filing authority not later than September 1 of the year for which an activity described in Section 176.006(a), Local Government Code, is pending and not later than the 7th business day after the date the originally filed questionnaire becomes incomplete or inaccurate.)

3

Describe each affiliation or business relationship with an employee or contractor of the local governmental entity who makes recommendations to a local government officer of the local governmental entity with respect to expenditure of money.

Cecil Bell, Jr. is a Bank Customer

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Describe each affiliation or business relationship with a person who is a local government officer and who appoints or employs a local government officer of the local governmental entity that is the subject of this questionnaire.

Bank Customer

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5 Name of local government officer with whom filer has affiliation or business relationship. (Complete this section only if the answer to A, B, or C is YES.)

This section, item 5 including subparts A, B, C & D, must be completed for each officer with whom the filer has affiliation or business relationship. Attach additional pages to this Form CIQ as necessary.

A. Is the local government officer named in this section receiving or likely to receive taxable income from the filer of the questionnaire?

Yes

No

Interest may or may not be earned in the Normal Course of Business

B. Is the filer of the questionnaire receiving or likely to receive taxable income from or at the direction of the local government officer named in this section AND the taxable income is not from the local governmental entity?

Yes

No

Normal Bank Income

C. Is the filer of this questionnaire affiliated with a corporation or other business entity that the local government officer serves as an officer or director, or holds an ownership of 10 percent or more?

Yes

No

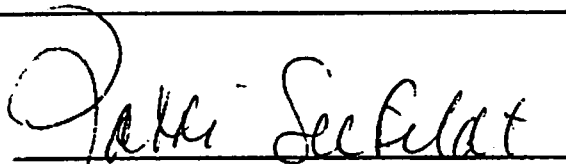
D. Describe each affiliation or business relationship.

Not Applicable

6 Describe any other affiliation or business relationship that might cause a conflict of interest.

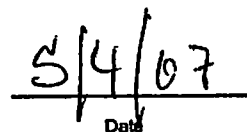
None

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Signature of person doing business with the governmental entity

Patti Seefeldt
Vice President



Date

THE UNIVERSITY OF CHICAGO

PHYSICS DEPARTMENT

PHYSICS 435: QUANTUM MECHANICS

LECTURE 10: THE HARMONIC OSCILLATOR

1. The harmonic oscillator is a fundamental system in quantum mechanics. It is the only potential for which the energy levels are equally spaced.

2. The potential energy of a harmonic oscillator is given by $V(x) = \frac{1}{2}kx^2$. The corresponding Schrödinger equation is $-\frac{\hbar^2}{2m}\frac{d^2\psi}{dx^2} + \frac{1}{2}kx^2\psi = E\psi$.

3. The energy levels of the harmonic oscillator are $E_n = \hbar\omega\left(n + \frac{1}{2}\right)$, where $\omega = \sqrt{k/m}$ is the angular frequency.

4. The wavefunctions are given by $\psi_n(x) = \frac{1}{\sqrt{2^n n!}} \left(\frac{m\omega}{\pi\hbar}\right)^{1/4} e^{-\frac{m\omega x^2}{2\hbar}} H_n\left(\sqrt{\frac{m\omega}{\hbar}}x\right)$, where H_n are the Hermite polynomials.

5. The ground state wavefunction is $\psi_0(x) = \left(\frac{m\omega}{\pi\hbar}\right)^{1/4} e^{-\frac{m\omega x^2}{2\hbar}}$.

6. The expectation value of the position in the ground state is $\langle x \rangle = 0$.

7. The uncertainty in position in the ground state is $\Delta x = \sqrt{\frac{\hbar}{2m\omega}}$.

8. The uncertainty in momentum in the ground state is $\Delta p = \sqrt{\frac{\hbar m\omega}{2}}$.

9. The product of the uncertainties is $\Delta x \Delta p = \frac{\hbar}{2}$, which is the minimum possible value.

10. The probability density in the ground state is $|\psi_0(x)|^2 = \left(\frac{m\omega}{\pi\hbar}\right)^{1/2} e^{-\frac{m\omega x^2}{\hbar}}$.

11. The probability of finding the particle in the region $-\Delta x < x < \Delta x$ is $\int_{-\Delta x}^{\Delta x} |\psi_0(x)|^2 dx = \frac{2}{\sqrt{\pi}} \int_0^{\sqrt{\pi}} e^{-t^2} dt$.

12. The probability is approximately 0.67 for $\Delta x = \sqrt{\frac{\hbar}{2m\omega}}$.

13. The probability of finding the particle in the region $x > \Delta x$ is $\int_{\Delta x}^{\infty} |\psi_0(x)|^2 dx = \frac{1}{\sqrt{\pi}} \int_{\sqrt{\pi}}^{\infty} e^{-t^2} dt$.

14. The probability is approximately 0.16 for $\Delta x = \sqrt{\frac{\hbar}{2m\omega}}$.