



**PHYS 3317: Quantum Mechanics**  
Thursday Aug 23, 2018

Hand in at beginning of next lecture

**Problem 1.** In classical mechanics we study how positions or momenta evolve. What do we study in quantum mechanics

**Solution 1.1.**

**Problem 2. Measurement**

**2.1.** If I know the wavefunction, do I know for certain where a particle is?      **Y**   **N**

**2.2.** Do I know for certain the particle must be somewhere?      **Y**   **N**

**2.3.** If I measure in quick succession, will I find the particle in the same place each time?   **Y**   **N**

**2.4.** What is the probability that I find the particle at position  $x$ ?

**Solution 2.4.**

**Problem 3. Dynamics**

What are the rules by which the wavefunction evolves in time?

**Solution 3.1.**

*Bored? Try the problem on the back*



**Problem 4. Bonus problem**

What is the physical meaning of each of the following:

**4.1.** The absolute value  $|\psi(x)|$

**Solution 4.1.**

**4.2.** The complex phase  $\phi(x) = \arg \psi(x)$

**Solution 4.2.**

**4.3.** The gradient of the phase  $\nabla\phi(x)$

**Solution 4.3.**

**4.4.** The real part of  $\psi(x)$

**Solution 4.4.**