Quantum Mechanics
Physics 237

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Course information

- Midterm Exam # 1 will take place on Thursday February 10, 2022, between 8 am and 9.30 am. Location: B&L 109.
- The material covered are Chapters 1 – 4.
- The material will be reviewed during a review session on Tuesday February 8, between 3:00 pm and 5:30 pm in B&L 480.
- Office hours:
  - Margaret Porcelli: Tuesday 8 – 10 pm, POA.
  - Frank Wolfs: Wednesday 9 – 11 am, B&L 203A.
  - Navya Uberoi: Wednesdays 1 - 3 pm, POA.

Time management on exams

- Work no more than 10 – 15 minutes on each problem.
- Even if not finished, move on to the next problem.
- This will leave 30 minutes at the end to finish your problems and/or make correction.
- We can only give credit for what you write (not what you think).
- We can only give credit for what we can read (write neatly).

Final Remarks about Exam # 1.

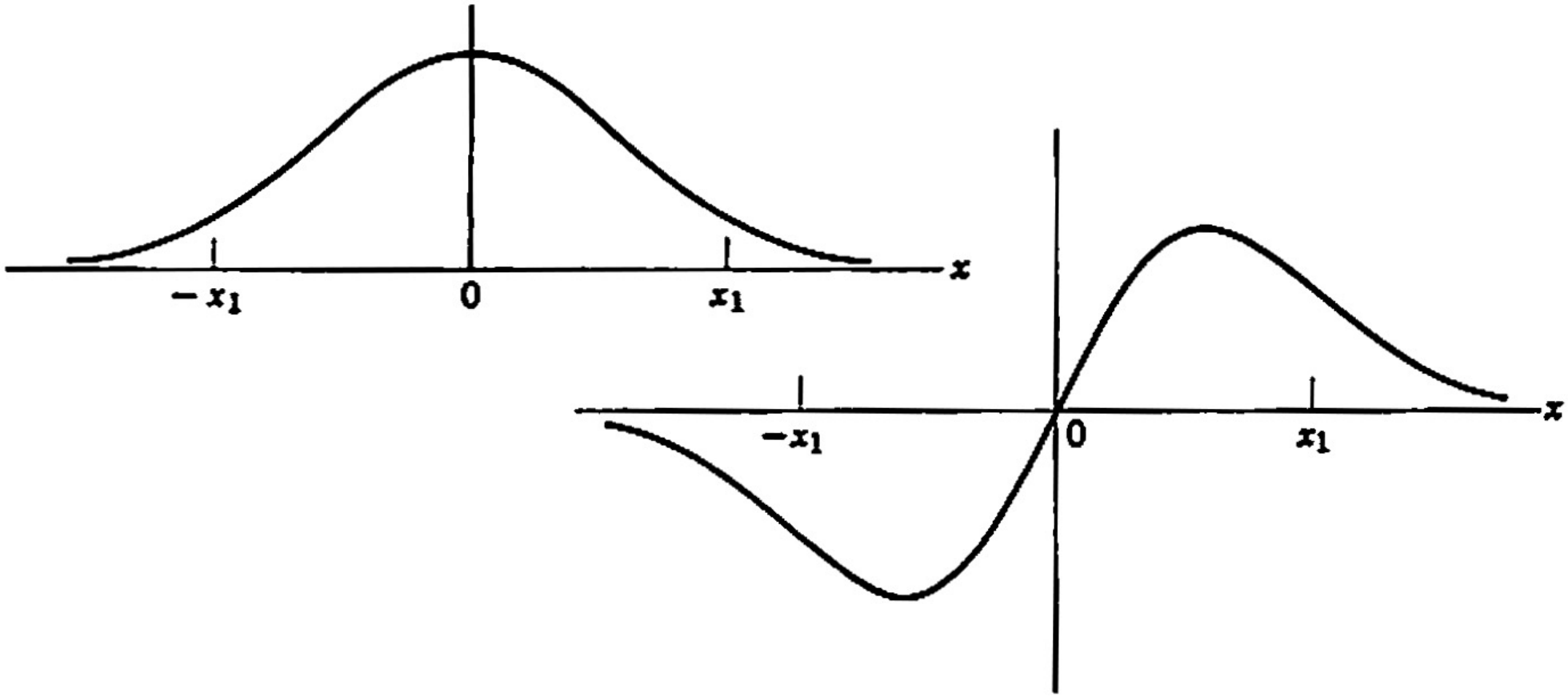
- Make sure you really understand the solutions to the homework assignments.
- Make sure you understand the material discussed in the textbook. I cannot cover everything during lecture. If I skip a specific topic, do not assume you can skip it to when you prepare for exam # 1.
- Make sure you pay attention to the correspondence principle discussed in Section 4.11. This makes an important connection between the classical world (large n) and the quantum world (small n).
- Your TAs will not see the exam until you see it.

Extra credit HW # 3

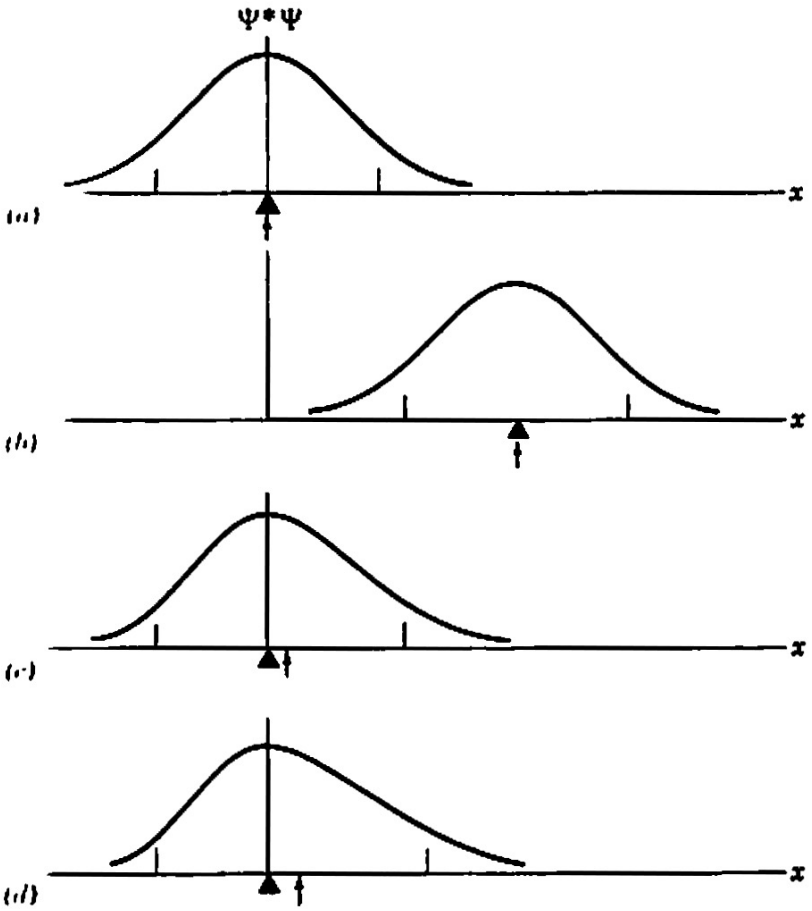
- Based on looking at the solutions to the extra credit problem of HW # 3, I need to make the following comments:
  - Check your answers for proper orders of magnitude results.
  - Relativistic effect start to become important when the velocities approach the speed of light (v/c > 0.1) or the kinetic energy is similar (1% – 10%) to the rest energy of the particles involved.
  - Make sure that you realize that the 0.511 MeV is the rest energy of the electron, not the rest mass. When you calculate the classical momentum of the electron as $\sqrt{(2mK)}$, m is the rest mass, not the rest energy. This expression can be rewritten as $(1/c)\sqrt{(2mc^2K)}$. **Note: if you use 0.511 MeV for the rest energy, make sure that *K* is also in units of MeV.**

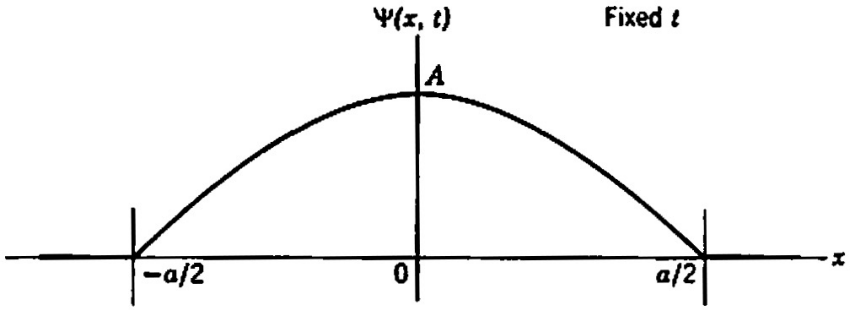
Do not worry.
I did not forget the airplane picture.

Wavefunctions.
Even and odd functions.



Wavefunctions and particle location.





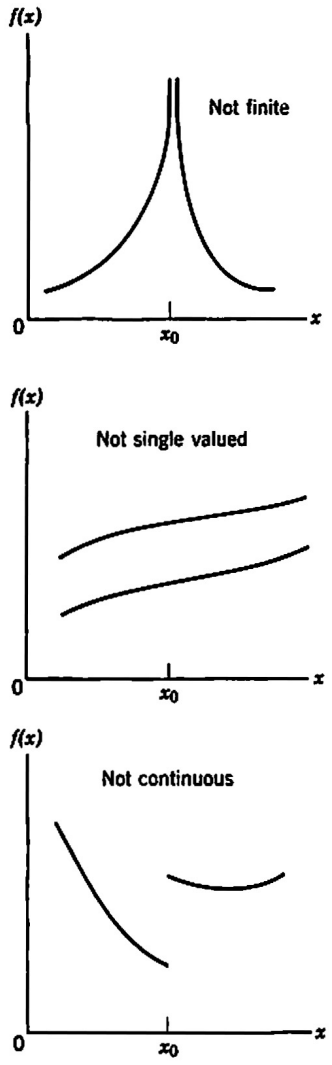
3 Minute 38 Second Intermission.

- Since paying attention for 1 hour and 15 minutes is hard when the topic is physics, let's take a 3 minute 38 second intermission.

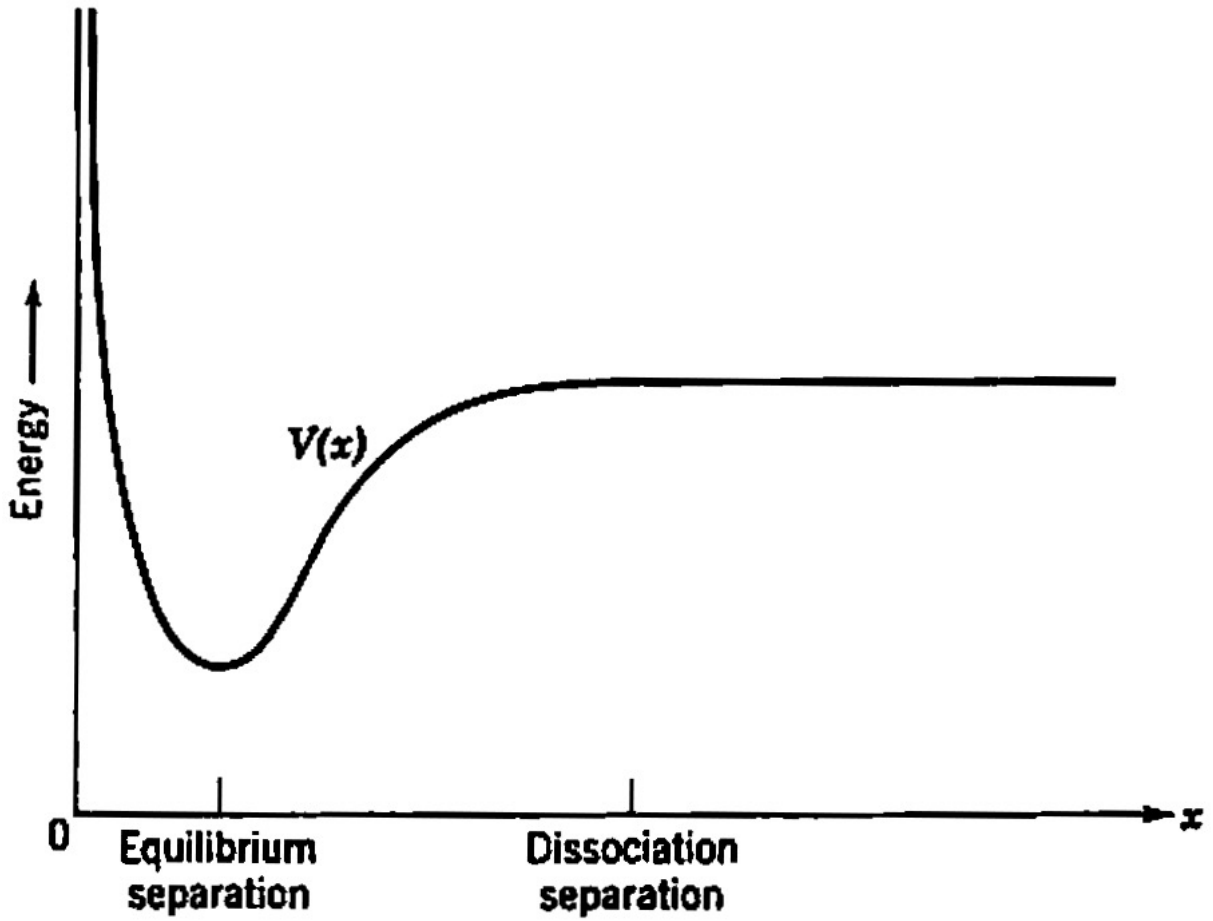
- You can:
  - Stretch out.
  - Talk to your neighbors.
  - Ask me a quick question.
  - Enjoy the fantastic music.

Requirements of wavefunctions.

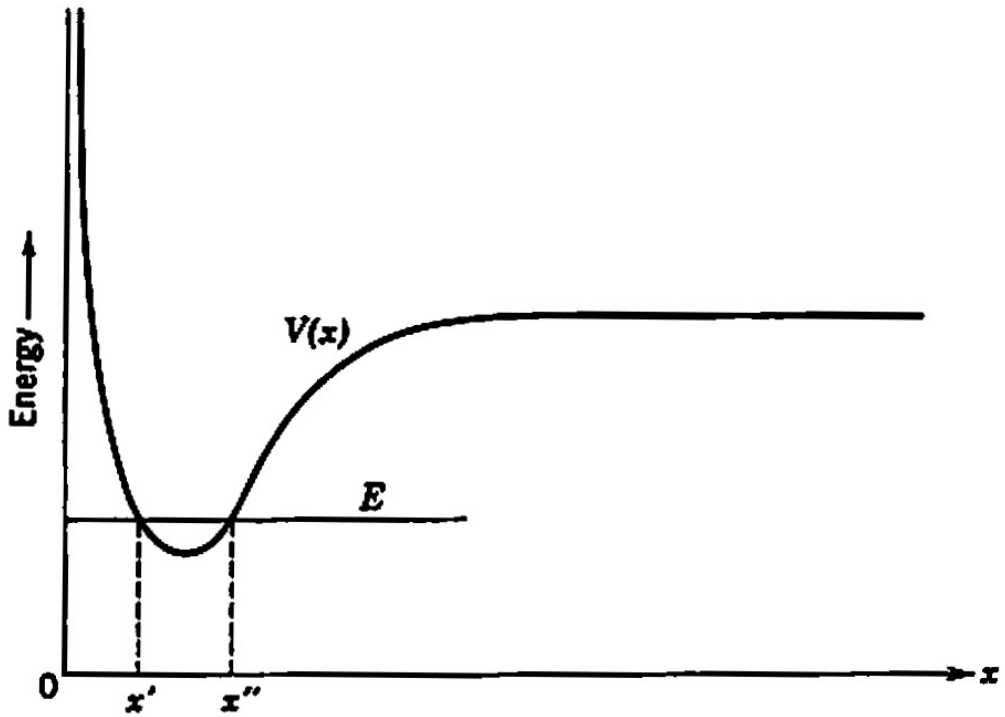
- Wavefunctions must satisfy the following requirements:
  - Must be finite everywhere.
  - Must be single valued.
  - Must be continuous.



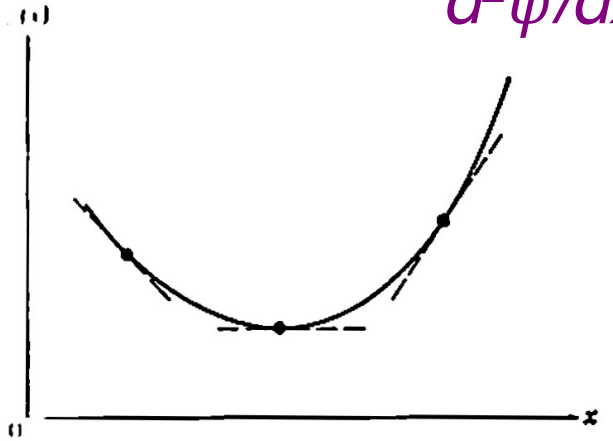
A typical potential.

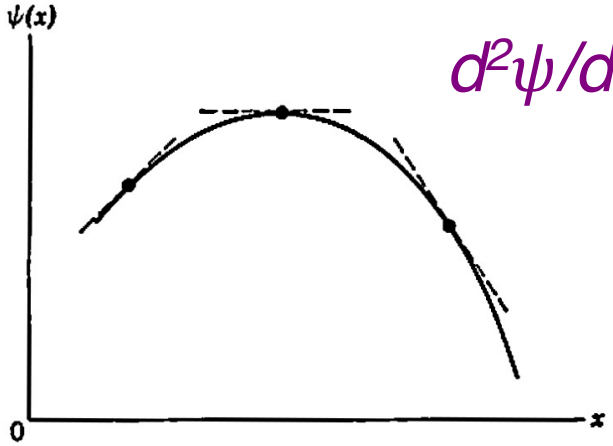


Properties of the wavefunction.



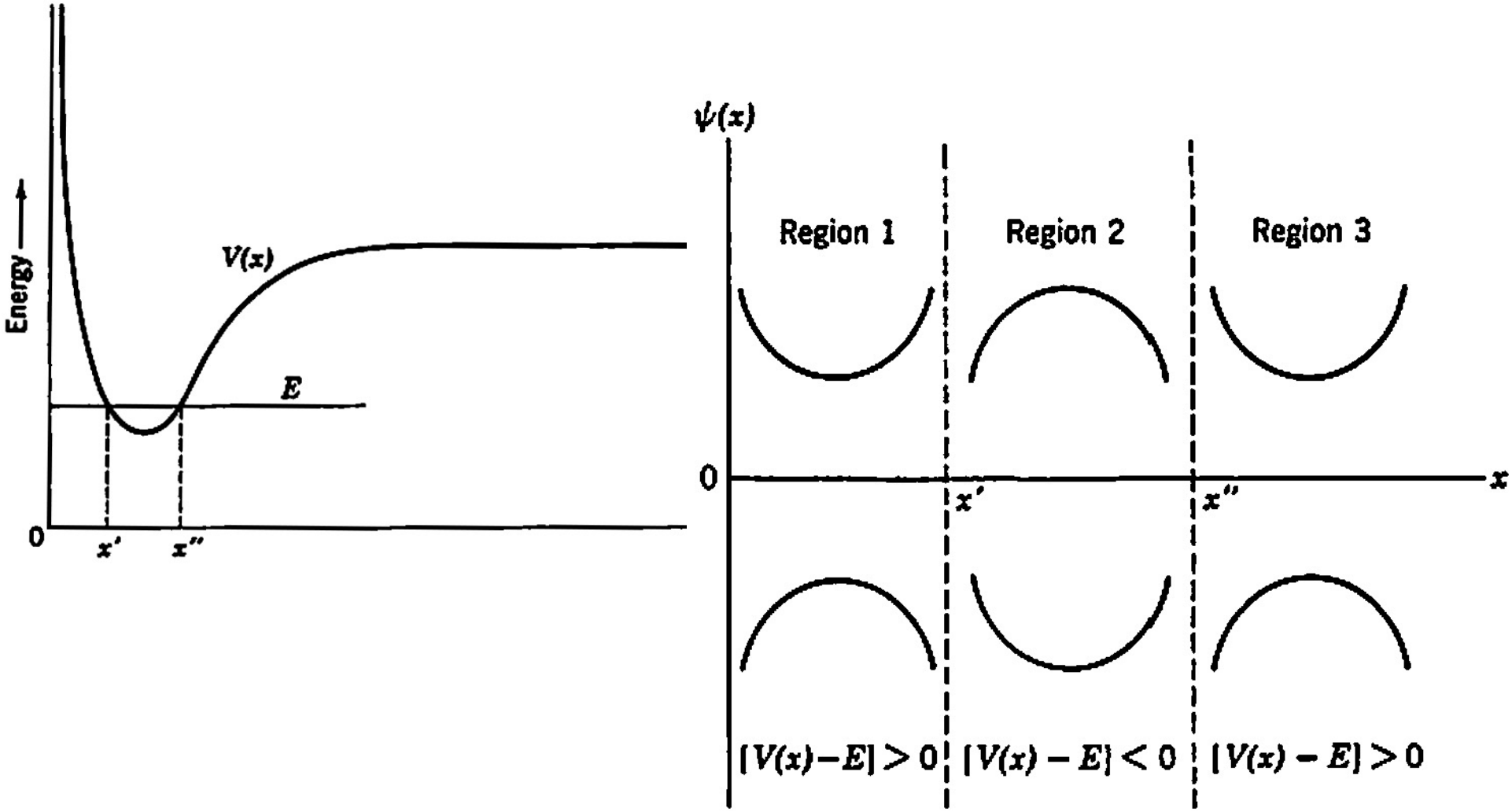
$d^2\psi/dx^2 > 0$



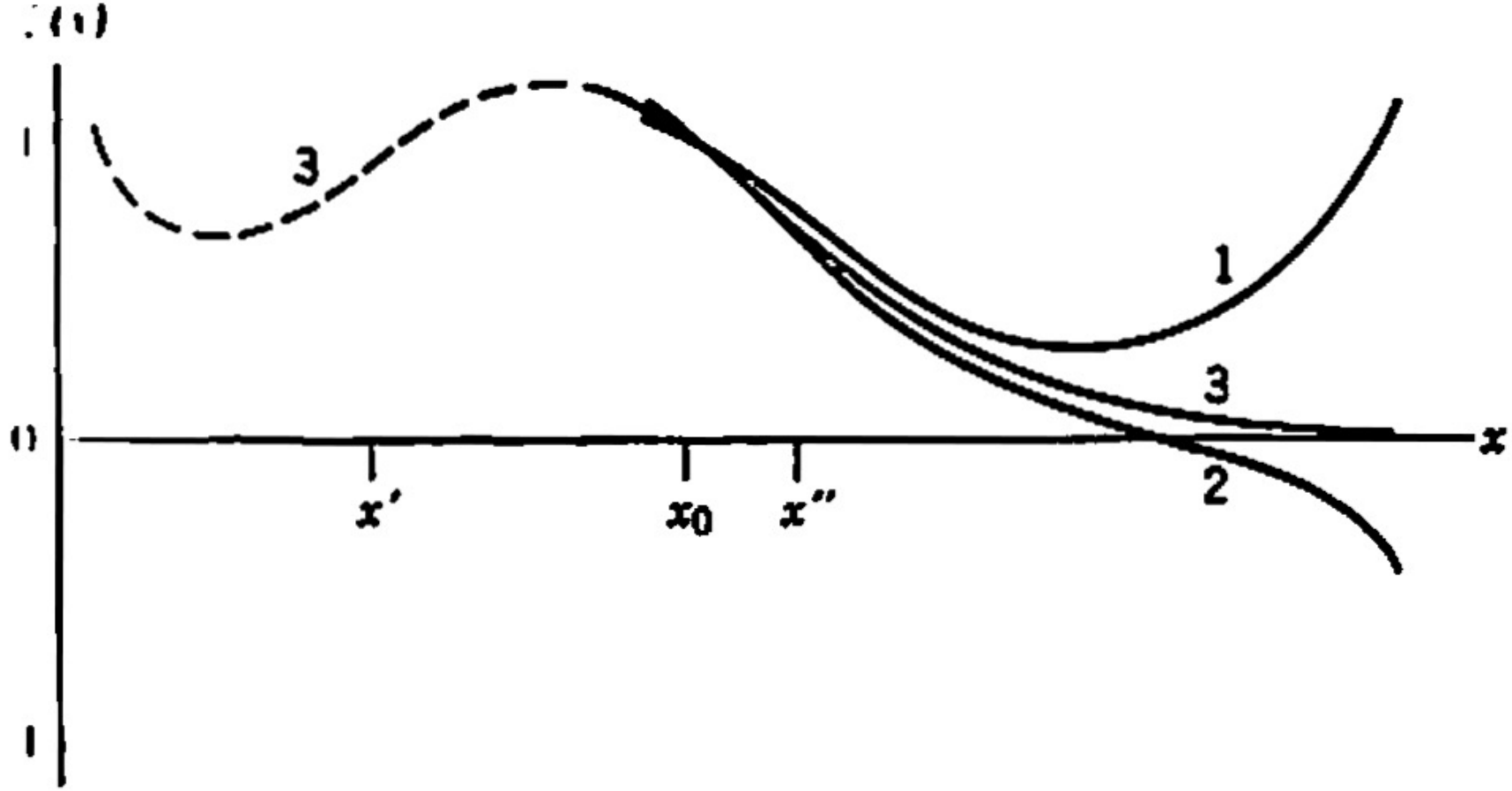


$d^2\psi/dx^2 < 0$

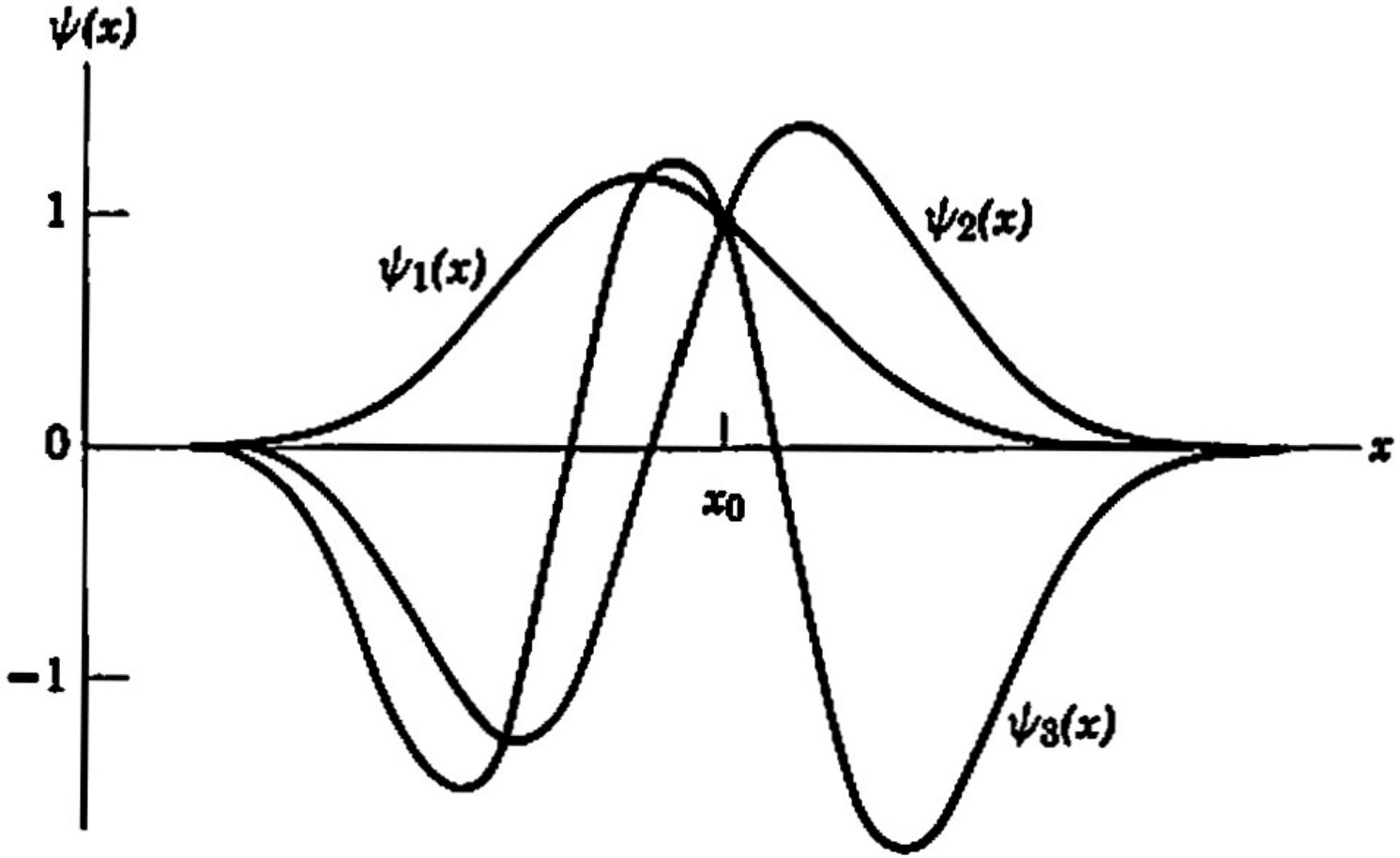
Understanding the shape of the wavefunction.



The shape of the wavefunction. What happens at large x?



Different wavefunctions. Different energies.



ENOUGH FOR TODAY?