| Scale | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Mark /10 for this criterion | Participant number: 3079736 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Calculation of ground state energy [Weighted at 10%]** | *Not calculated* | | | | *Major error in calculation that should have been spotted and corrected.* | | *Minor error in calculation* | | | | *Correctly and efficiently calculated using Runge Kutta methods as used in previous sessions, and fully explained* | **9** | Would have been better to set up the secant code as a function from the start, otherwise v good here |
| **Calculation of ground state wavefunction [Weighted at 5%]** | *Not calculated* | | | | *Major error in calculation that should have been spotted and corrected.* | | *Minor error in calculation* | | | | *Correctly and efficiently calculated and normalised, with complete text cell explanations* | **9** | Normalization code is a bit inefficient (think about the properties of the end points) |
| **Comparison with analytical results [Weighted at 5%]** | *Not compared* | | | | *Compared and found to be different, without explanation or commentary* | | | | | | *Fully compared and verified* | **10** | |
| **Excited state wavefunctions and energies [Weighted at 10%]** | *Not calculated* | | | | *Major error or omission in calculation or interpretation.* | | *Minor error, eg valid wavefunctions but not those for n = 2, 3, 4, or minor omission* | | *Correctly calculated, but uses known analytical values for E_n as guesses* | | *Correctly calculated, and correctly interpreted, with an intelligent method used for initial guesses* | **9** | Excellent and clearly explained approach to choosing the energy guess values. The comparison of analytical and numerical results is hindered by the presence of many individual plots. It would've been clearer to overlay these curves. |
| **Large n excited states [Weighted at 2%]** | *Not calculated* | | | | | *Calculated but with errors or wrong interpretation* | | | | | *At least two high-energy states (18 ≤ n ≤ 28) calculated correctly and verified, with the value of n explicitly checked.* | **10** | |
| **Embedded harmonic potential [Weighted at 10%]** | *Not calculated* | | | | *Major error or omisson in calculation or interpretation.* | | *Minor errors or omissions, or omissions / misunderstanding in the interpretation of the results* | | *Correctly calculated for both ground state and low-lying excited states, fully compared qualitatively with analytical harmonic potential results.* | | *Also compared quantitatively with analytical harmonic potential results, with fully complete and correct interpretation and discussion* | **8** | Minor issue that the introduction of the problem leaves it unclear that the harmonic potential is embedded in an infinite well. As elsewhere, it is also slightly difficult to follow things as there is a large number of plots with very little text in between to discuss them or to help with take-away messages. |
| **Embedded finite square well [Weighted at 10%]** | *Not calculated* | | | | *Major error or omission in calculation or interpretation.* | | *Minor errors or omissions, or omissions / misunderstanding in the interpretation of the results* | | *Correctly calculated for both ground state and low-lying excited states, fully compared qualitatively with analytical finite square results.* | | *Also compared quantitatively with "textbook" finite square well results, with fully complete and correct interpretation and discussion* | **7.5** | |
| **Own choice of potential [Weighted at 10%]** | *Not calculated* | | | *Major error in calculation or interpretation.* | | *Poor choice, or minor calculation / interpretation errors.* | | *Generally sensible choice, correctly calculated and well-interpreted.* | | | *Excellent and original choice, justfied, correctly calculated, and with a relevant, in-depth interpretation.* | **7** | Several potentials presented here, but it would have been better to pick just one and go into much more depth of analysis |
| **Units (overall - missing units will also be penalised in the relevant section) [Weighted at 3%]** | *No units present!* | | | | *Most units missing /wrong* | | *Mostly present and correct, but a few units missing or wrong.* | | | | *Units are present and correct throughout in both text cells and code comments* | **5** | Units were not always given. Docstrings didn't specify the units of the inputs and outputs of the functions, some potential values were assigned without mention of the units, etc. |
| **Overall quality of plots [Weighted at 10%]** | *No plots produced by the submitted code.* | | | *Inadequate plots - for example, frequent missing axis labels or titles.* | | *Most but not all requirements of the plots met - for example, occasional missing legends, or errors in the axis labels/title* | | *All plot requirements met: everything is clearly plotted and correctly and appropriately labelled.* | | | *Exemplary plots throughout, aesthetically perfect in every respect, publication quality.* | **7** | The plotting machinery set up for this notebook is impressive. However, many of the plots are potentially superfluous (e.g., probability densities) given the issues you have spotted with the sheer number of plots. Also, the analytical and numerical wavefunctions could've easily been overlaid on a single figure for each pair rather than being plotted up as two separate figures which take up space and are hard to compare by eye. In some cases, x-axis units were not given in the labels. The potential well walls were not labelled. Very good use of continuous (wavefunctions, potential functions) and discrete (analytical vs numerical copmarison for values of n) plot styles. Also very good additional effort to label the energy levels individually for the potential curve plots. |
| **Overall quality of code style [Weighted at 5%]** | *Code would require significant correction before it can be run.* | | | *Code has errors (requiring the marker to correct it before it can be run) - for example an undefined variable or code cells wrongly ordered.* | | *The code runs with no errors, but is somewhat inefficient or poorly structured, or has a poor choice of variable names* | | *Code is clear, follows best practice guidelines, with a good effort made to ensure appropriate variable names and efficiency of calculation. Runs without errors or warnings.* | | | *Code is exceptionally clear, efficient, outstandingly well-structured and follows best practice throughout.* | **4** | It would've been sufficient to define the secant method as a separate function once and use that as needed. The plotting setup of the code is massive and impressive, but it is not clear that it is required to adequately (in terms of top mark potential) carry out the work.<br>Code fails in several places as you've attempted to use local images (see the guidance and instructions in the script) |
| **Overall quality of the commenting in the code cells [Weighted at 5%]** | *No comments are included* | | | *Significant lack of useful comments in the submitted code.* | *Missing some/all docstrings in functions* | *Code is undercommented, unnecessarily verbose, or so unnecessarily overcommented that readability is affected. Nonetheless, the comments remain decipherable and are of some use.* | | *Code is clearly and appropriately commented. Complicated parts of code have a higher level of commenting than simpler parts. Coded pasted/repurposed from other sources is clearly referenced as such.* | | | *Exceptional level of commenting and code documentation throughout the code. Clear, concise and readable throughout* | **6** | Generally adequately commented code. A few small bits of code appear without explanation, cell [35] to bring one example. |
| **Overall quality of text cells and discussion [Weighted at 12%]** | *Text cells have not been included* | | | *Not enough text cells included to create a self-contained document, or poor quality, for example grammatical/linguistic errors severely affecting the readability of the commentary.* | | *Acceptable commentary, but needs expansion in several areas.* | | *A clear, self-contained document. Text cells consist of complete, well-structured and grammatical paragraphs. It is clear what the student is calculating, how they are going about it, and why they are doing it. A clear understanding of the physics of the problem is demonstrated.* | | | *Exceptional quality of the text commentary, resulting in an exemplary, self-contained document of publication-ready quality. Results are fully discussed, showing an outstanding understanding of the physics.* | **8** | |
| **Referencing and Bibliography [Weighted at 3%]** | *Bibliography is missing* | | | *Bibliography is present but is lacking multiple sources, and/or citations are missing in the text cell discussion* | | | *The bibliography is present, contains all relevant sources, and is cited at the appropriate points in the text throughout.* | *In addition, the sources included in the bibliography indicate the student has read around the topics more widely and has selected key relevant sources to include and cite.* | | | *Outstanding bibliography with exemplary presentation, indicating exceptional insight into the relevant research literature.* | **7** | Good, but should have been in Harvard format rather than numeric |
| | | | | | | | | | | | **TOTAL (/100)** | **77.20** | |