

1. The third problem on the first page of the 1-d mechanical system exercises.

**Discussion.** This is called a potential barrier. Be sure to compare and contrast the orbits that have energy respectively less than and greater than the maximum of  $V$ .

In quantum mechanics, as opposed to classical mechanics, such barriers are not impassable even for states whose total energy is less than the maximum of  $V$ . This quantum mechanical effect is called *tunnelling*.

The problems below are close cousins. By the end, you either hate me or you get the hang of it and they look straight forward. I have my fingers crossed that there are not too many of you in the former category. You can view this assignment as an Inquiry Based Learning approach to Bifurcation Theory. One more bifurcation handout question will be on the next assignment.

2. Exercise 1.1 of the Bifurcations handout.
3. Exercise 3.1 of the Bifurcation handout.
4. Exercise 3.2 of the Bifurcation handout.
5. Exercise 3.3 of the Bifurcation handout.
6. Exercise 3.4 of the Bifurcation handout.
7. Exercise 3.5 of the Bifurcation handout.