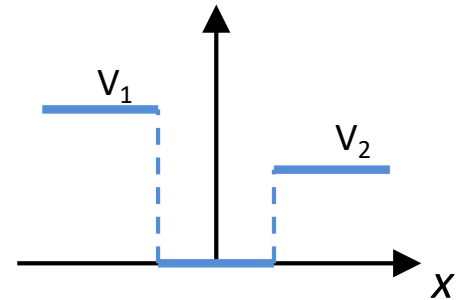


## 5c. Square Quantum Well

- **sqw.cpp**: write a program to find the energy levels of the asymmetric finite potential well in quantum mechanics. These are the roots of the transcendental equation

$$\sqrt{E} = s\pi - \sin^{-1} \left( \sqrt{\frac{E}{V_1}} \right) - \sin^{-1} \left( \sqrt{\frac{E}{V_2}} \right)$$



- Here  $E$  (already normalized to  $\hbar^2/(mL^2)$ ) is the energy of the particle in the well while  $s = 1, 2, 3, \dots$  is the quantum energy number.  $V_1$  and  $V_2$  are the potentials on the left and on the right, respectively,
- Choose  $V_1 = 250$  and  $V_2 = 80$  and obtain the first three energy levels using bisection and secant method, with a tolerance of  $10^{-8}$ . Write at least the 6 decimal digits.
- As a rule of thumb, your initial search interval should not exceed the domain of the function. For the secant method to succeed, you may have to improve it a little bit.
- Upload your code with i) the output inserted in the comments at the beginning of the file, ii) the required library function at the end, e.g.

```
// Name: <your name>
// Date: <date>
// Code output:
// *****
// Bisection, results:
// s = 1; Root: ??; ntry = ??
// s = 2; Root: ??; ntry = ??
// s = 3; Root: ??; ntry = ??
// Secant, results:
// s = 1; Root: ??; ntry = ??
// s = 2; Root: ??; ntry = ??
// s = 3; Root: ??; ntry = ??
// *****
#include ...
...
int main()
{
    // code here
}

void Bisection(...){

}

void Secant(..){

}
```