First-order (forward) Euler method for the QHO

**stepsize**

\[
h = 0.01000000000000000000000000000000;
\]

**number of steps**

\[
n = 1000;
\]

**Guess for energy (in units of 1/2 hbar \(\omega\))**

\[
e = 1.005687913746380211740000000000;
\]

\[
u = 0.00000000000000000000000000000000;
\]

**Look for odd solutions**

\[
y_1 = 0.00000000000000000000000000000000;
\]

\[
y_2 = 1.00000000000000000000000000000000;
\]

**Look for even solutions**

\[
y_1 = 1.00000000000000000000000000000000;
\]

\[
y_2 = 0.00000000000000000000000000000000;
\]

```plaintext
For[i = 1, i <= n, i++,
    u = u + h;
    temp1 = y1;
    temp2 = y2;
    y1 = temp1 + h * temp2;
    y2 = temp2 + h * (u^2 - e) * temp1;
    a[i] = u; b[i] = y1;
]
```
ListPlot[Table[{a[i], b[i]}, {i, 1, n}], PlotRange -> {-5, 5}]

ListPlot[Table[{a[i], b[i]}, {i, 1, n}], PlotRange -> {-0.1, 1.1}]