First-order Euler method for the SHO

stepsize

In[928]:=
```
h = .01;
```

number of steps

In[929]:=
```
n = 1000;
```

Guess for energy

stepsize h = 0.01, ground state

In[930]:=
```
ϵ = 1.0056879137463808904229 2;
```

In[931]:=
```
u = 0;
```

Look for odd solutions

In[932]:=
```
y1 = 0;
y2 = 1;
```

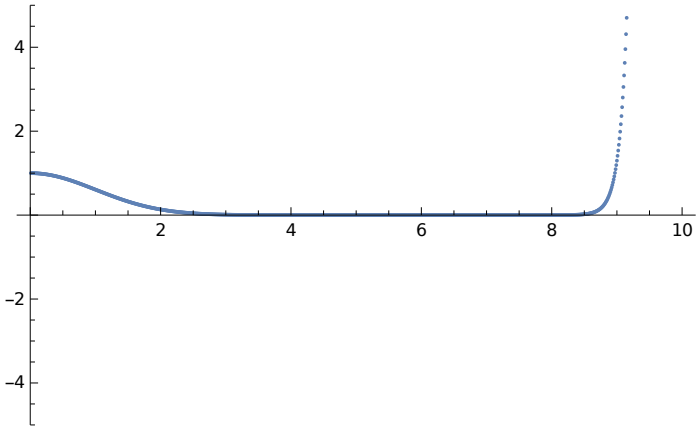
Look for even solutions (this overrides the previous commands)

In[934]:=
```
y1 = 1;
y2 = 0;
```

In[936]:=
```
For[i = 1, i <= n, i++,
 u = u + h;
 tmp1 = y1;
 y1 = y1 + h * y2;
 y2 = y2 + h * (u^2 - ϵ) * tmp1;
 a[i] = u; b[i] = y1;
]
```

In[937]:=
```
ListPlot[Table[{a[i], b[i]}, {i, 1, n}], PlotRange → {-5, 5}]
```

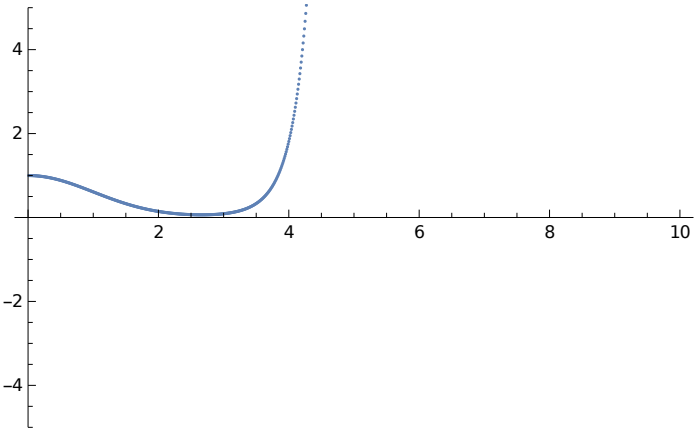
Out[937]=



These are my first “shots” at ϵ

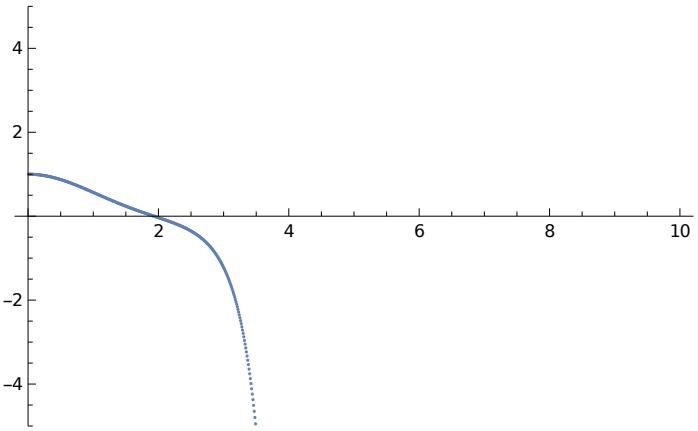
```
ϵ = 1.000000000; (*Too small *)
```

Out[20]=



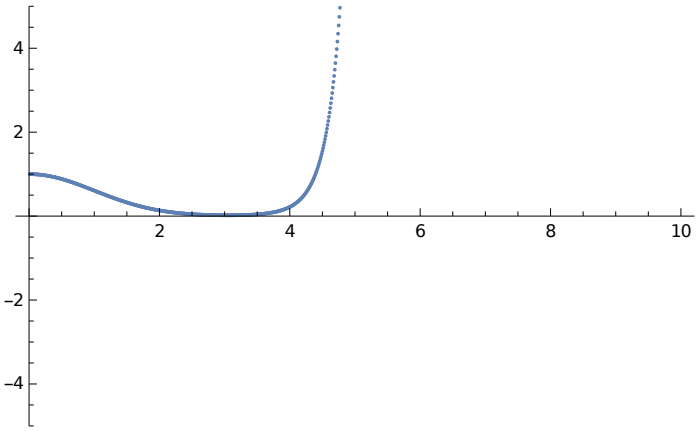

```
ϵ = 1.100000000;  (*Too big *)
```

Out[30]=



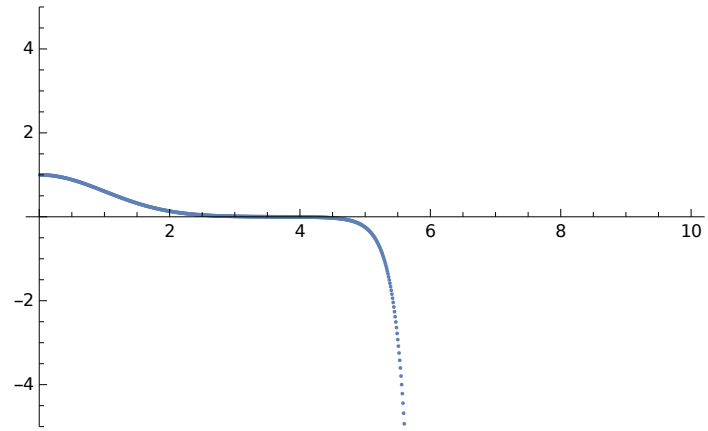
```
ϵ = 1.0050000000;  (*Too small *)
```

Out[50]=




```
ϵ = 1.0057000000;  (*Too big *)
```

Out[111]=




```
ϵ = 1.005687900000;  (*Too small *)
```

Out[252]=