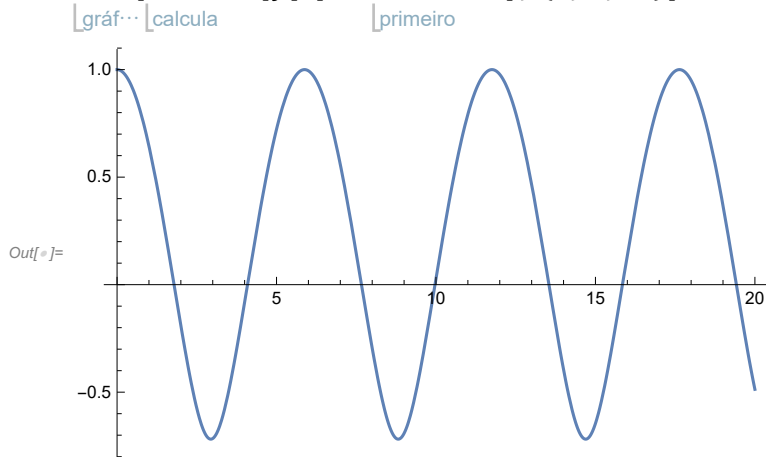


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```
In[ ]:=  $\omega_p = 1;$   
 $T_f = 20;$   
 $y_x = 1;$   
 $y_v = 0;$ 
```

```
sol = NDSolve[ $\{y''[t] == -\frac{1}{2} \omega_p^2 * \frac{(1+y[t])^2 - 1}{1+y[t]}$ ,  $y[0] == y_x$ ,  $y'[0] == y_v\}$ ,  $y[t]$ ,  $\{t, 0, T_f\}$ ];
```

```
Plot[Evaluate[y[t] /. First@sol], {t, 0, T_f}]
```



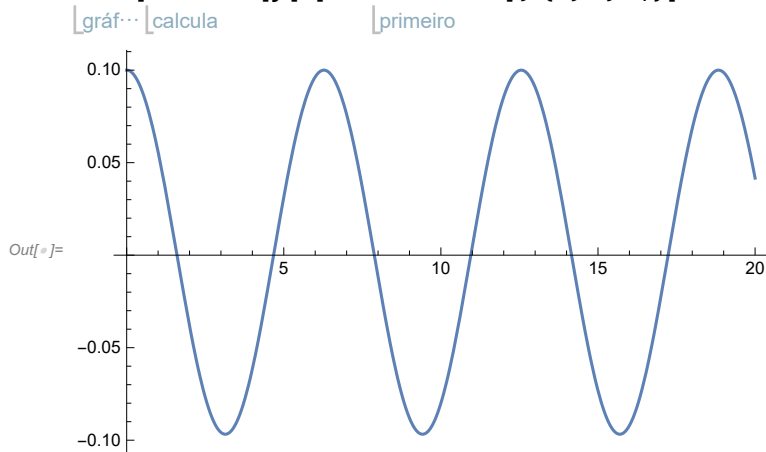
```
In[ ]:= Table[FindRoot[Evaluate[y[t] /. First@sol], {t, 2 * i}], {i, 1, 5}]
```

```
Out[ ]:= {{t -> 1.78675}, {t -> 4.09112}, {t -> 15.8469}, {t -> 7.66462}, {t -> 9.96899}}
```

```
In[ ]:=  $\omega_p = 1;$   
 $T_f = 20;$   
 $y_x = 0.1;$   
 $y_v = 0;$ 
```

```
sol = NDSolve[ $\{y''[t] == -\frac{1}{2} \omega_p^2 * \frac{(1+y[t])^2 - 1}{1+y[t]}$ ,  $y[0] == y_x$ ,  $y'[0] == y_v\}$ ,  $y[t]$ ,  $\{t, 0, T_f\}$ ];
```

```
Plot[Evaluate[y[t] /. First@sol], {t, 0, T_f}]
```



```
In[ ]:= Table[FindRoot[Evaluate[y[t] /. First@sol], {t, 2 * i}], {i, 1, 5}]
```

```
Out[ ]:= {{t -> 1.60237}, {t -> 4.67574}, {t -> 1.60237}, {t -> 7.88049}, {t -> 10.9539}}
```

```
In[ ]:=  $\omega_p = 1;$   

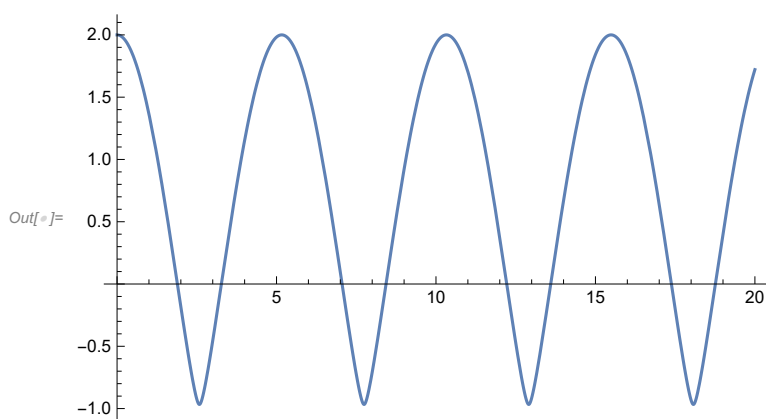
 $T_f = 20;$   

 $y_x = 2;$   

 $y_v = 0;$ 
```

```
sol = NDSolve[{y''[t] == - $\frac{1}{2} \omega_p^2 * \frac{(1 + y[t])^2 - 1}{1 + y[t]}$ , y[0] == y_x, y'[0] == y_v}, y[t], {t, 0, T_f}];
```

```
Plot[Evaluate[y[t] /. First@sol], {t, 0, T_f}]
```



```
In[ ]:= Table[FindRoot[Evaluate[y[t] /. First@sol], {t, 2 * i}], {i, 1, 5}]
```

```
Out[ ]:= {{t -> 1.89251}, {t -> 3.27081}, {t -> 7.05583}, {t -> 8.43413}, {t -> 8.43413}}
```