The distance, $d(t)$ (in light-years) that the starship Enterprise has travelled from Earth after a time, $t$ (years) is given by

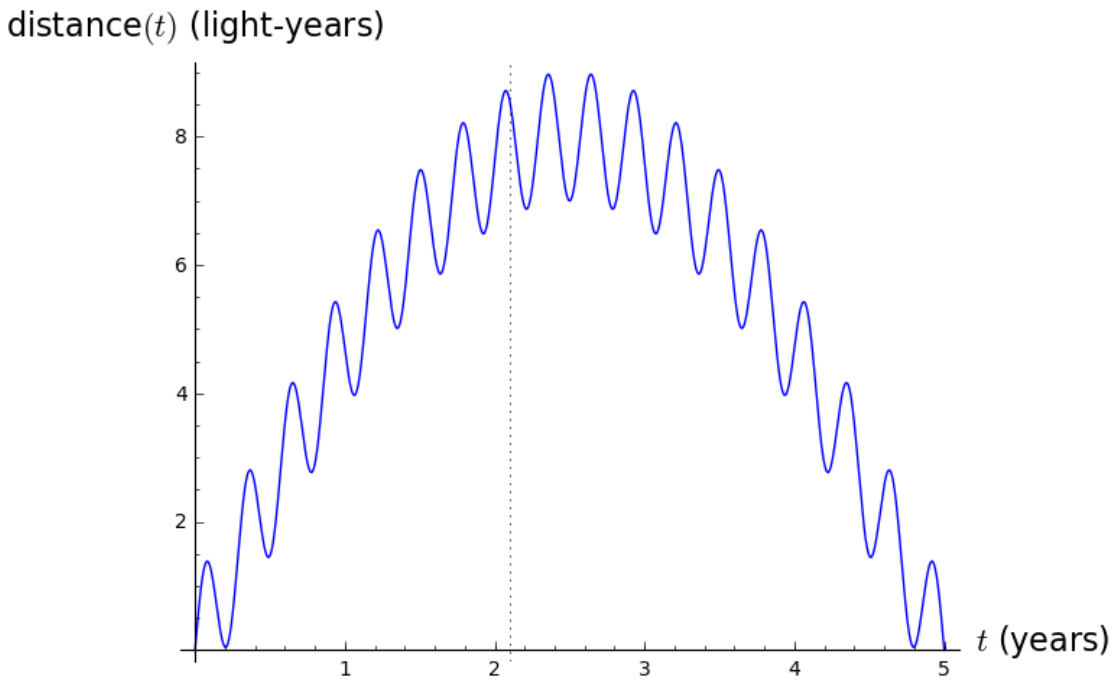
$$8\sin\left(\frac{\pi}{5}t\right) + \sin(7\pi t)$$

In [24]:
```
t=var('t')

d(t)=8*sin((pi/5)*t) + sin(7*pi*t)

show(plot( d,t, 0, 5, axes_labels=["$t$ (years)","distance$(t)$ (light-years)"], f
igsize=(8,5),
    gridlines=[[2.1],[]]))
```

Out[24]:




In [25]:
```
dp(t)=diff(d(t),t) #This is the derivative of d(t).

[    n( d(2.1)),    n((d(2.1)-d(0))/(2.1-0)),    n(dp(2.1)) ]
```

Out[25]: [8.55768228340399, 4.07508680162095, -11.6760210973706]

It would appear that $d(2.1) = 8.55$, and $\frac{d(2.1)-d(0)}{2.1-0} = 4.075$, and $d\ (2.1) = -11.68$.

Draw on the graph...

1. The line whose slope represents the **average speed of the Enterprise during the first 2.1 years of its mission**.
2. The line whose slope represents the **instantaneous velocity of the Enterprise 2.1 years after its mission started**.