AN ALTERNATIVE TO THE LOAN LENGTH FORMULA (p.189)

EXAMPLE 2

Claude wants to borrow $25,000 to purchase a car. After looking at his monthly budget, he realizes that all he can afford to pay per month is $300. The bank is offering a 5.9% loan. What would the length of his loan need to be so that he can stay within his budget?

The development of the loan length formula is beyond the scope of this course. That formula requires the use of the natural logarithm in order to solve for the exponent t.

Loan Length Formula

$$t = \frac{\ln\left(\frac{M}{p}\right) - \left(\ln\left(\frac{M}{p} - \frac{r}{12}\right)\right)}{12\ln\left(1 + \frac{r}{12}\right)}$$

where M = monthly payment
p = principal
r = interest rate
t = number of years

Substitute $p = 25{,}000$, $M = 300$, and $r = 0.059$.

$$t = \frac{\ln\left(\frac{300}{25{,}000}\right) - \left(\ln\left(\frac{300}{25{,}000} - \frac{0.059}{12}\right)\right)}{12\ln\left(1 + \frac{0.059}{12}\right)}$$

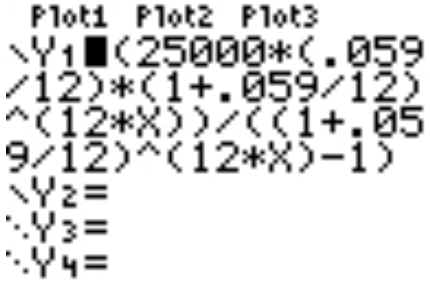
Calculate to the nearest hundredth of a year. $t \approx 8.96$

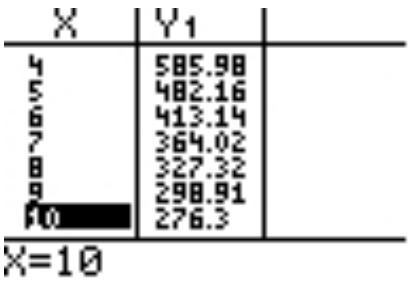
Claude would need to take out a loan for about 9 years.

CHECK YOUR UNDERSTANDING

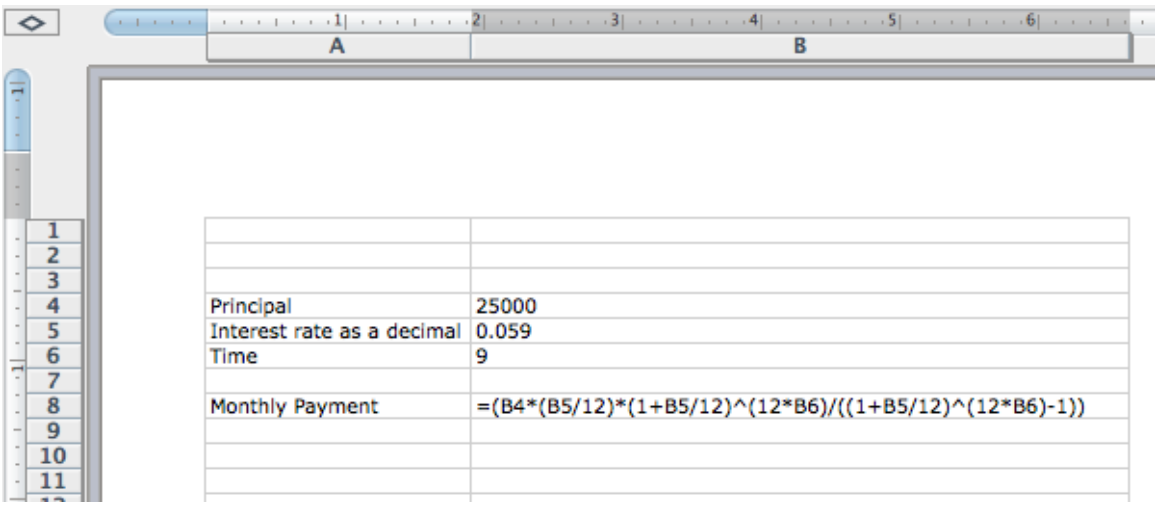
In Example 2, what impact would an increase in the monthly payment of $50 have on the length of the loan?

Graphing Calculator (or Graphing Software)

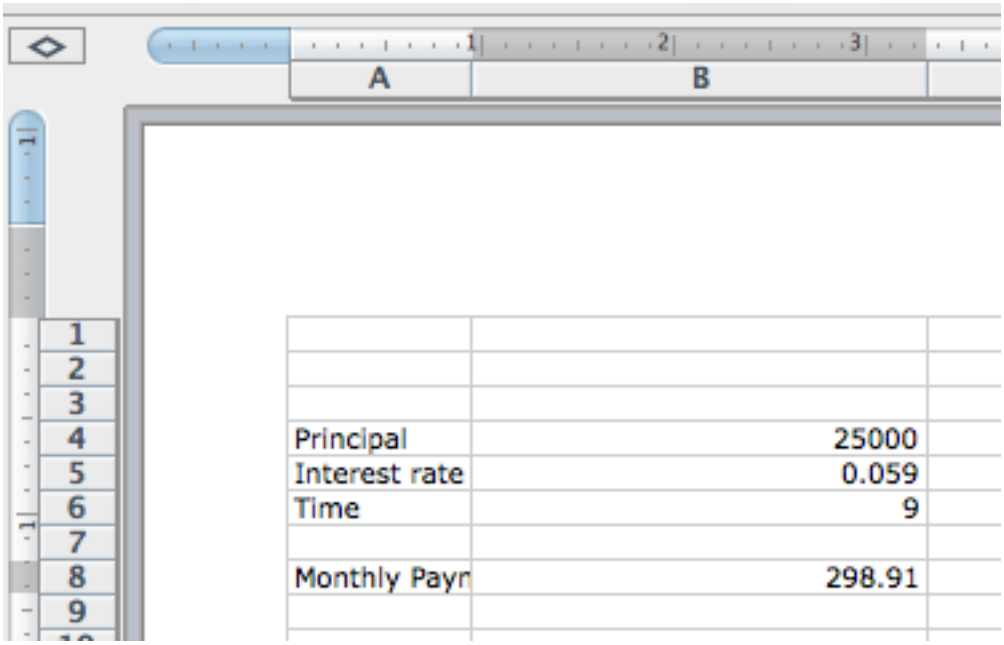




SPREADSHEET



	A	B
1		
2		
3		
4	Principal	25000
5	Interest rate as a decimal	0.059
6	Time	9
7		
8	Monthly Payment	=(B4*(B5/12)*(1+B5/12)^(12*B6)/((1+B5/12)^(12*B6)-1))
9		
10		
11		



	A	B
1		
2		
3		
4	Principal	25000
5	Interest rate	0.059
6	Time	9
7		
8	Monthly Payr	298.91
9		