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Math 1050 Credit Card Debt Assignment

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You have received your monthly credit card statement and must now deal with the financial realities of last month's birthday celebration. While your milestone in years was deserving of a celebration, dealing with the $2000 in credit card charges will require some planning.

Your credit card statement lists the APR (Annual Percentage Rate) for your balance to be 14.5%. This is the yearly interest rate the credit card company uses in calculating interest due on your balance. The credit card company compounds interest monthly. Your monthly interest rate on credit card charges will be:

$$i = \frac{APR}{12} = \frac{0.145}{12} \approx 0.012083$$

The minimum payment required by your credit card company is $25/month. Assuming that you do not make any new charges to your account, answer the following questions to help you determine the best plan for paying off this credit card debt.

1. To begin with, let's check out the plan of only paying the minimum amount due each month. To get a feel for how this will affect the balance, finish filling in the following table using the minimum monthly payment of $25.

Month	Old Balance	Interest	Payment	New Balance
1	$2000.00	$24.17	$25.00	$1999.17
2	$1999.17	$24.16	$25.00	$1998.32
3	$1998.32	$24.15	$25.00	$1997.47
4	$1997.47	$24.14	$25.00	$1996.60
5	$1996.60	$24.12	$25.00	$1995.73
6	$1995.73	$24.11	$25.00	$1994.84
7	$1994.84	$24.10	$25.00	$1993.95
8	$1993.95	$24.09	$25.00	$1993.04
9	$1993.04	$24.08	$25.00	$1992.12
10	$1992.12	$24.07	$25.00	$1991.19
11	$1991.19	$24.06	$25.00	$1990.25
12	$1990.25	$24.05	$25.00	$1989.30

What is the total amount that has been paid to the credit card company at the end of the first year?

$300.00 → Payment 12 x 25

How much of the original balance has been paid off at the end of the first year?

$10.70 Subtract the New Bale. $2000 - 1989.30 from the Old Balance

From looking at the new balances over the first year, how many years do you think it will take to pay off the $2000? (This is a guess so there is no wrong answer. Before going on to step 2, write down your best estimate.)

200 years

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5. How large would your monthly payment have to be in order to pay off your debt in 12 months? Round **up** to the next nearest cent.

$$P = \frac{24.16600}{1-(1.012083)^{-12}} = \$180.0447 \approx \$180.05$$

What is the total amount paid to the credit card company, rounded to the nearest dollar?

$\$180.0447 \times 12 \approx \$2161$

6. What is the best plan for paying off the $2000? Why?

Make the full payment of $2000 & pay it off. This way you don't accrue interest

What is the worst plan? Why?

To pay the minimum amount, because it will cost you the most & take the longest to pay it off.

What should you do if you cannot afford to make the payments required by the best plan?

Pay as much as possible every month

7. What are two things that the average consumer can learn by completing this assignment?

i. If making purchases try to only put as much as you can in order to pay off at the end of the month.

ii. Use credit cards for emergencies only & use the money you've been setting aside for those emergencies to pay it off immediately & if you plan to have the balance on your card for awhile to understand exactly what your paying

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2. A formula for calculating the payment, P, required to pay off a debt of amount D in M months with monthly interest rate i is

$$P = \frac{D \cdot i}{1-(1+i)^{-M}} \qquad 25 = \frac{2000 \cdot 0.012083}{1-(1+0.012083)^{-m}}$$

Using this formula, solve for M to determine the number of months it will take to pay off the $2000 credit card debt with minimum monthly payments of $25. Round the number of months to two decimal places. (Attach all work for this assignment to the end.)

See page 4 Solution: 283.12 months

How long is this in years, rounded to the nearest tenth of a year?

$283.12 \div 12 \approx 23.6$

What is the total amount paid to the credit card company, rounded to the nearest dollar?

$283.12 \times 25 \approx \$7078.00$

3. How many months will be required to pay off the debt if you pay $50 each month? Round to two decimal places.

$50 - 50(1.012083)^{-m} = 24.166$ -50

$\frac{-50(1.012083)^{-m}}{-50} = \frac{-25.834}{-50}$ $\log_{1.012083}(1.012083)^{-m} =$

See PAGE 4

Solution 54.98 months

How long is this in years, rounded to the nearest tenth of a year?

$54.98 \div 12 \approx 4.6$ years

What is the total amount paid to the credit card company, rounded to the nearest dollar?

$54.98 \times 50 \approx 2749.00$

4. How many months will be required to pay off the debt if you pay $75 each month? Round to two decimal places.

See page 5 32.38 months

How long is this in years, rounded to the nearest tenth of a year?

$32.38 \div 12 \approx 2.7$ years

What is the total amount paid to the credit card company, rounded to the nearest dollar?

$32.38 \times 75 \approx \$2429$ paid to cc.

2.) $P = \frac{D \cdot i}{1-(1+i)^{-m}}$

$$25 = \frac{2000 \cdot 0.012083}{1-(1+0.012083^{-m}}$$

$$-25 \quad -25(1.012083)^{-m} = 24.166 \quad -25$$

$$\frac{-25(1.012083)^{-m}}{-25} = \frac{-0.834}{-25}$$

$$1.012083^{-m} = 0.03336$$

$$\log_{1.012083}(1.012083)^{-m} = -m = \log_{1.012083}(0.03336)$$

$$\frac{-m}{-} = \frac{-283.117}{-}$$

Solution: 283.12 months

3.) $50 \quad -50(1.012083)^{-m} = 24.166 \quad -50$

$$\frac{-50(1.012083)^{-m}}{-50} = \frac{-25.834}{-50}$$

$$\log_{1.012083}(1.012083)^{-m} = \log_{1.012083}(0.51668)$$

$$\frac{-m}{-} = -\frac{54.9791}{-}$$

$$= 54.98$$

Solution:
54.98 months

4.) $75 - 75(1.012083)^{-m} = 24.16600$
$-75 \qquad\qquad -75$

$$\frac{-75(1.012083)^{-m}}{-75} = \frac{-50.834}{-75}$$

$$\log_{(1.012083)}(1.012083)^{-m} = \log_{(1.012083)}(0.677787)$$

$$-m = -32.3816$$
$$-\quad\quad -$$

Solution:
32.38 months

$m = 32.38$