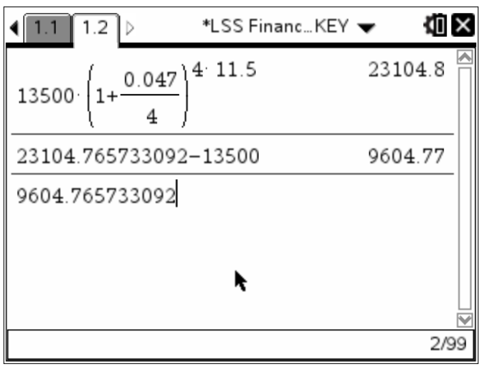
Linear Systems and STAT Finance Examination - KEY

Name: ________________________________ Date: ___________ Period: ____

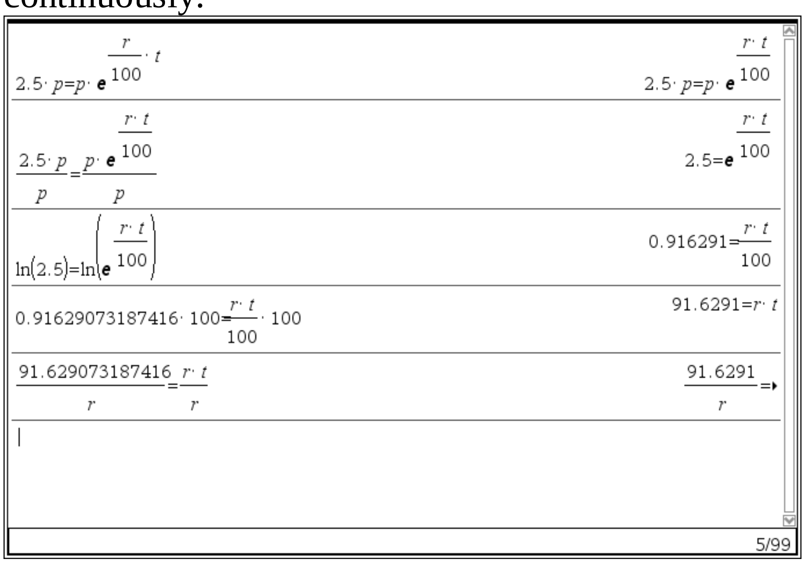
$$I = P*r*t \quad A = P*(1+\frac{r}{n})^{n*t} \quad A = P*(e)^{r*t}$$

1. Compare and Contrast Simple Interest and APR,
Both are annual interest rates, but APR represents some result from compounding and is just an effective annual rate. It is used on a monthly basis to determine an interest charge and would then reflect a different balance from month to month. With simple interest this is just assuming you have an amount of stagnate money in the bank for a year, from year to year, with no compounding.

2. Ert wants to invest $13,500 at 4.7% interest compounded quarterly for 11.5 years. How much will they have at the end? How much interest will they earn?



3. Determine a rule to calculate the number of years it would take you to create 2.5 times your investment if invested at an interest rate of R% compounded continuously.



The Rule of 90!?

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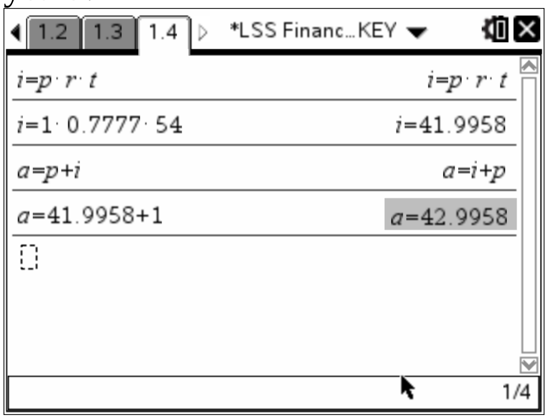
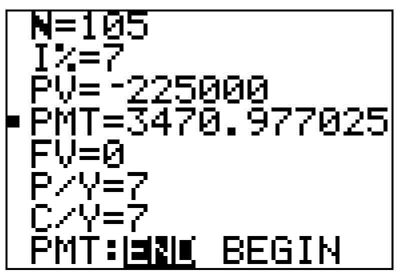
4. How much money would you have if you invested $1 at 77.77% interest for 54 years?



5. Explain the scenario:



You want to know how much money you collect 7 times a year over the next 15 years, if you invest $225,000 at 7% interested compounded 7 times a year.

6. If you decide to buy that thing at Best Buy for $2,500 and put it on your credit card with an APR of 20% and decide to make only the minimum required monthly payment ($60) on your balance, how much will that $2,500-thing actually cost you after a year? How did you determine this?

I paid $60 each month which is $720. After a year my balance is $2245.51 so I reduced my balance by only $254.49. Therefore the difference 720-254.49, which is $465.51 should be added to the $2500 cost of that thing. After a year the cost is now $2,965.51.

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	A balance	B payment	C interest	D new_bal	E	F	G	H	I	J
◆										
1	2500	60	40.6667	2480.67						
2	2480.67	60	40.3444	2461.01						
3	2461.01	60	40.0169	2441.03						
4	2441.03	60	39.6838	2420.71						
5	2420.71	60	39.3452	2400.06						
6	2400.06	60	39.0009	2379.06						
7	2379.06	60	38.651	2357.71						
8	2357.71	60	38.2951	2336.						
9	2336.	60	37.9334	2313.94						
10	2313.94	60	37.5656	2291.5						
11	2291.5	60	37.1917	2268.69						
12	2268.69	60	36.8116	2245.51						
13										
14										
15										

C1 $= \frac{(a[1]-b[1])\cdot 0.2}{12}$

7. Find the time it takes to increase your $11,000 investment to $43,000 when you are compounding continuously at 7.0% per year, and compare it to the time it would take if you were compounding each week at the same rate.

It would take 0.0125 years longer compounding weekly.

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$43000=11000\cdot e^{0.07\cdot}$ ▸	$43000=11000\cdot(1.07251$ ▸
$\frac{43000}{11000}=\frac{11000\cdot(1.0725081812542}{11000}$ ▸	$\frac{43}{11}=(1.07251)$ ▸
$\ln\left(\frac{43}{11}\right)=\ln((1.0725081812542)$ ▸	$\ln\left(\frac{43}{11}\right)=0.07\cdot$ ▸
$\frac{\ln\left(\frac{43.}{11}\right)}{0.07}=\frac{0.07\cdot t}{0.07}$ ▸	$19.4758=1.\cdot$ ▸
$19.475783469931=t$	$19.4758=t$

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$43000=11000\cdot\left(1+\frac{0.07}{50}\right)^{50\cdot}$ ▸	$43000=11000\cdot(1.07246$ ▸
$\frac{43000}{11000}=\frac{11000\cdot(1.0724556786364}{11000}$ ▸	$\frac{43}{11}=(1.07246)$ ▸
$\log_{1.07246}\left(\frac{43}{11}\right)=$ ▸	$19.4883=$ ▸
$19.488290752248=t$	

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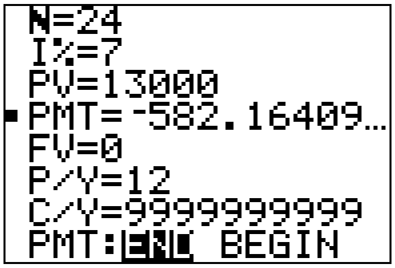
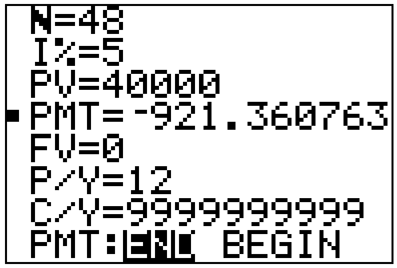
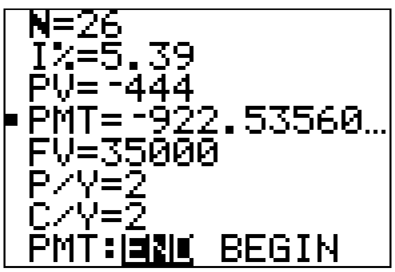
8. Which is a better deal?
Buying a 40,000 car at 7% compounded continuously for 24 months with a $27,000 down payment, or buying the same car with no down payment at 5% compounded continuously for 48 months? Why would you say such a thing?
The first situation is better because you make 24 payments of $582 vs. 48 payments of over $900.

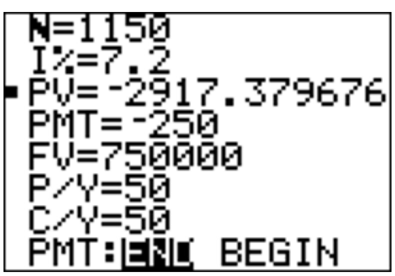




9. If Pal wanted to have her initial investment of $444 to grow to $35,000 by making semiannual payments into an account that compounded semiannually at a rate of 5.39 percent over 13 years, what would her semiannual contribution need to be?



10. After Mert made weekly deposits of $250 into an account that compounded weekly at the rate of 7.2% over 22 years, he had an investment of approximately $750,000. How much was his initial investment?



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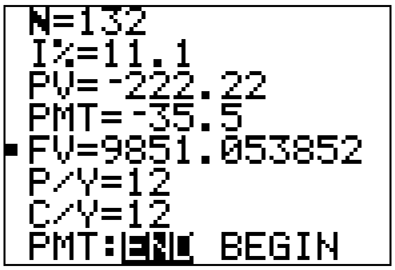
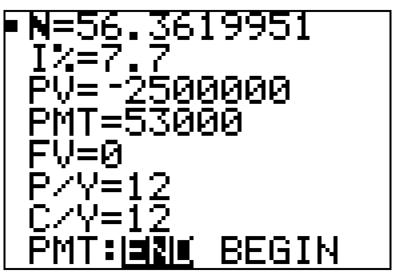
11. Gertly need to start saving so he puts $222.22 in an account that pays 11.1% interest compounded monthly for 11 years. He wants to get as much money as he can, so he also deposits the money he normally spends each month on movies, each month. How much do you think he deposits each month and based on that, what will his balance be after the 11 years?

I think he spends $35.50 a month on movies, so …

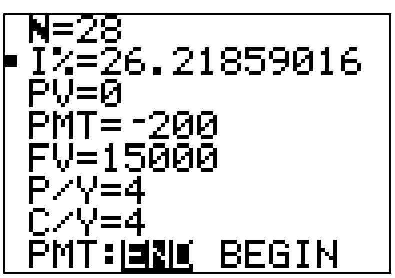


12. How many years would it take Titer to spend her inheritance of $2,500,000 if she has it in an account that compounds monthly at 7.7% and she pulls out $53,000.00 each month to spend?

About 4.7 years.



13. Yopi is looking for an investment that will allow her to accumulate $15,000 over 7 years when she deposits $200 at the end of each quarter. What rate of interest would she need if it compounds quarterly?



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14. Write a formula for the sum of this infinite geometric sequence.

$$\sum_{k=1}^{\infty} 512\left(\frac{1}{4}\right)^{k-1} \qquad 512 * \left(\frac{1}{1-\frac{1}{4}}\right)$$

15. Expand the series and then evaluate it.

$$\sum_{k=1}^{6} 2187\left(\frac{1}{3}\right)^{k-1}$$

$$\sum_{k=1}^{6}\left(2187\cdot\left(\frac{1}{3}\right)^{k-1}\right) \quad 3276$$

$$2187\cdot\left(\frac{1}{3}\right)^{1-1} \quad 2187$$

$$2187\cdot\left(\frac{1}{3}\right)^{2-1} \quad 729$$

$$2187\cdot\left(\frac{1}{3}\right)^{3-1} \quad 243$$

$$2187\cdot\left(\frac{1}{3}\right)^{4-1} \quad 81$$

$$2187\cdot\left(\frac{1}{3}\right)^{5-1} \quad 27$$

$$2187\cdot\left(\frac{1}{3}\right)^{6-1} \quad 9$$

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16. A new car sells for $55,349. It exponentially depreciates at a rate of 9.9% to $33,300. How long did it take the car to depreciate to this amount? Round your answer to the nearest tenth of a year.

It would take about 4.9 years.

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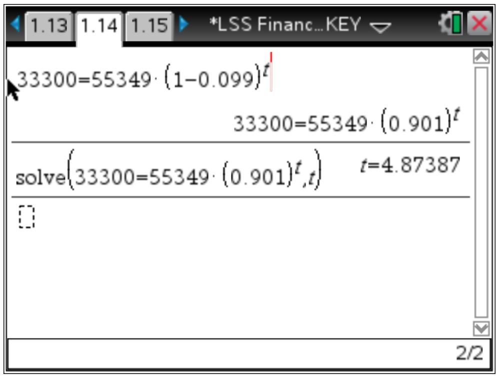
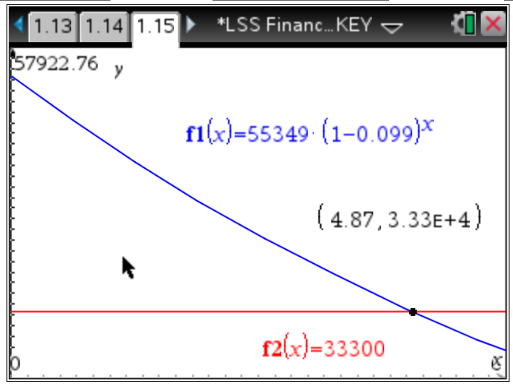
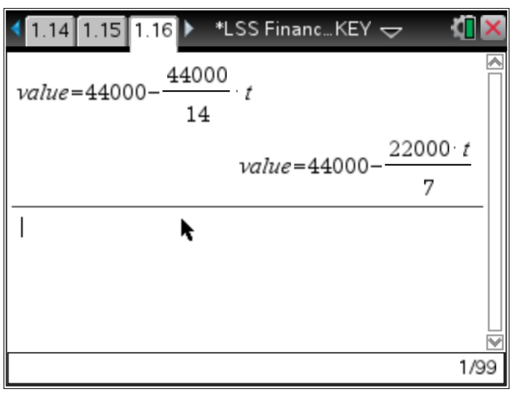




17. Straight Line Depreciation
A car is originally worth \$44,000. It takes 14 years for this car to totally depreciate.

a. Write the straight line depreciation equation for this situation.



b. How long will it take for the car to be worth half of its value?
It would take 7 years.

c. How long will it take for the car to be worth \$20,000? Round your answer to the nearest tenth of a year.