Name Schlansky
Mr. Schlansky

Date ____________
Algebra II

Exponents/Logarithms/Functions Review Sheet

MC Strategy

1. The expression $\left(\frac{m^2}{m^{\frac{1}{3}}}\right)^{-\frac{1}{2}}$. 146... is equivalent to

1) $-\sqrt[6]{m^5}$
2) $\frac{1}{\sqrt[6]{m^5}}$. 146...
3) $-m\sqrt[5]{m}$
4) $\frac{1}{m\sqrt[5]{m}}$

2. The expression $\sqrt[4]{81x^2y^5}$ 280... is equivalent to

1) $3x^{\frac{1}{2}}y^{\frac{5}{4}}$ 280...
2) $3x^{\frac{1}{2}}y^{\frac{4}{5}}$
3) $9xy^{\frac{5}{2}}$
4) $9xy^{\frac{2}{5}}$

3. The solution set of $\sqrt{3x+16} = x+2$ is
1) $\{-3,4\}$
2) $\{-4,3\}$ −4 STO ⇒ x 2=−2 ✗
3) $\{3\}$ 3 STO ⇒ x 5=5 ✓
4) $\{-4\}$

4. The solution set of the equation $\sqrt{2x-4} = x-2$ is
1) $\{-2,-4\}$
2) $\{2,4\}$ 2 STO ⇒ x 0=0 ✓
3) $\{4\}$ 4 STO ⇒ x 2=2 ✓
4) $\{\ \}$

MC strategy

5. The solution to the equation $6\left(2^{x+4}\right) = 36$ is

1) -1
2) $\dfrac{\ln 36}{\ln 12} - 4$
3) $\ln(3) - 4$
4) $\dfrac{\ln 6}{\ln 2} - 4 \rightarrow x$

$36 = 36$ ✓

$\dfrac{6(2^{x+4})}{6} = \dfrac{36}{6}$

$\ln 2^{x+4} = \ln 6$

$\dfrac{(x+4)\ln 2}{\ln 2} = \dfrac{\ln 6}{\ln 2}$

$x+4 = \dfrac{\ln 6}{\ln 2}$

$-4 \qquad -4$

$x = \dfrac{\ln 6}{\ln 2} - 4$

6. Which is the solution to: $5(3)^{2x} = 30$?

1) $\dfrac{\log 6}{3\log 2}$
2) $\dfrac{\log 6}{2\log 3} \rightarrow x$
3) $\dfrac{2\log 6}{\log 3}$
4) $\dfrac{2\log 3}{\log 6}$

$30 = 30$ ✓

$\dfrac{5(3)^{2x}}{5} = \dfrac{30}{5}$

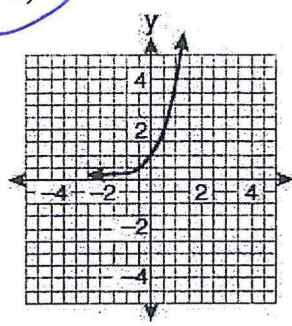
$\log 3^{2x} = \log 6$

$\dfrac{2x\log 3}{2\log 3} = \dfrac{\log 6}{2\log 3}$

$x = \dfrac{\log 6}{2\log 3}$

7. If a function is defined by the equation $f(x) = \log_4 x$, which graph represents the inverse of this function?

exponential

1)


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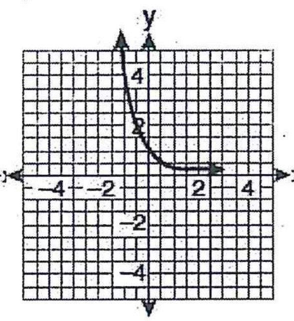

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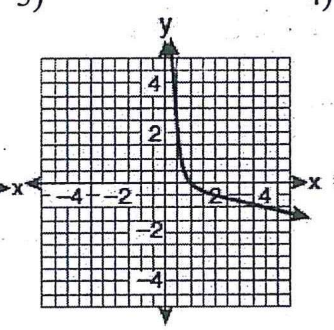

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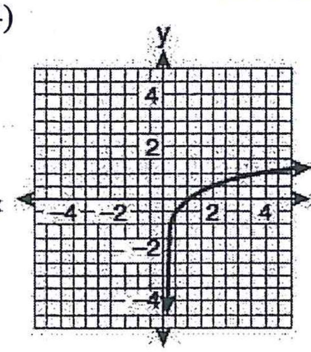
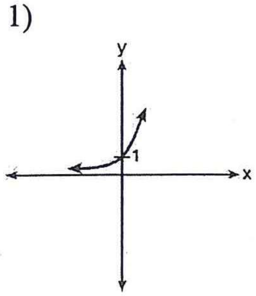


log

8. Which sketch shows the inverse of $y = a^x$, where $a > 1$?

1)


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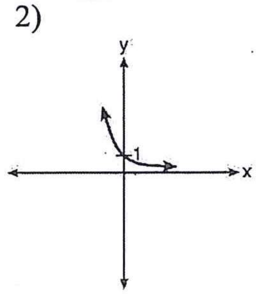

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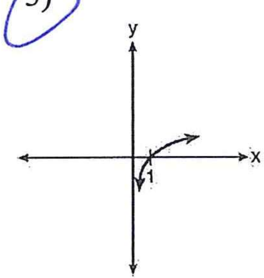

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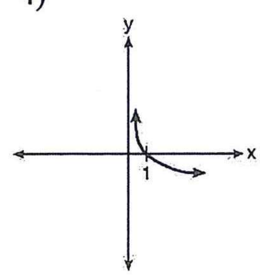
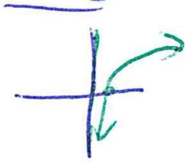


exponential

inverses of each other

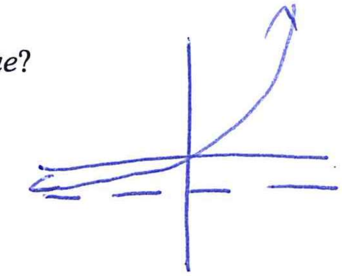
log



Type into Y=

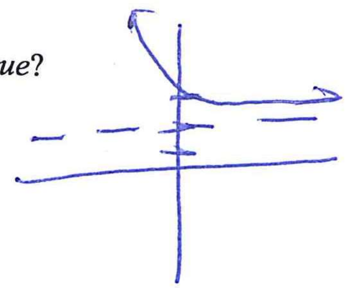
9. Which statement about the graph of $f(x)=2^x-1$ is *true*?

1) It is always increasing with a y intercept of 0
2) It is always decreasing with a y intercept of 0
3) It is always increasing with a y intercept of -1
4) It is always decreasing with a y intercept of -1



10. Which statement about the graph of the equation $f(x)=\frac{1}{3}^x+2$ is *true*?

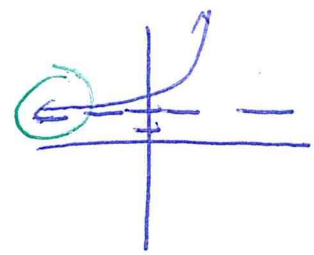
1) It is always increasing with a y intercept of 2
2) It is always decreasing with a y intercept of 2
3) It is always increasing with a y intercept of 3
4) It is always decreasing with a y intercept of 3



11. Given $f(x)=3^{x-1}+2$, as $x\to-\infty$ left

1) $f(x)\to-1$
2) $f(x)\to 0$
3) $f(x)\to 2$
4) $f(x)\to-\infty$

y=2 asymptote



12. For the equation $f(x)=-\log_3(x+1)-2$, as $x\to\infty$

1) $f(x)\to-\infty$
2) $f(x)\to-1$
3) $f(x)\to\infty$
4) $f(x)\to-2$

13. $y=2(3)^{x+1}-8$

Domain: $(-\infty,\infty)$

Range: $(-8,\infty)$

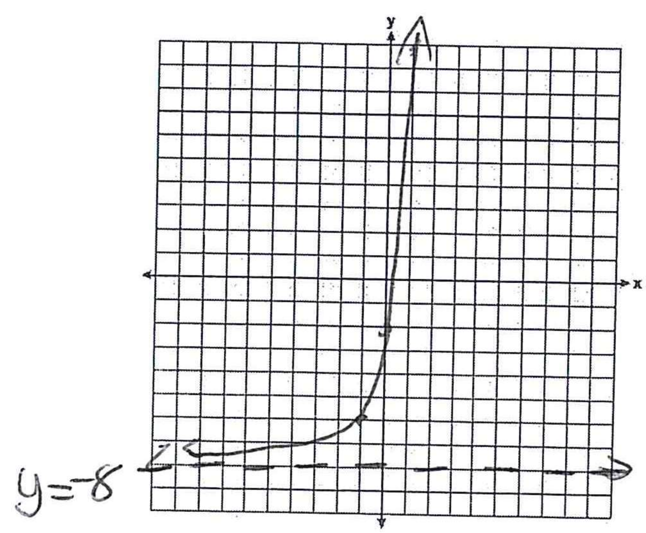
Asymptote: $y=-8$

End Behavior:

$x\to-\infty$, $f(x)\to -8$

$x\to\infty$, $f(x)\to\infty$

X	y
-1	-6
0	-2
1	10



14. $y = -2\left(\frac{1}{3}\right)^{x-5} + 9$

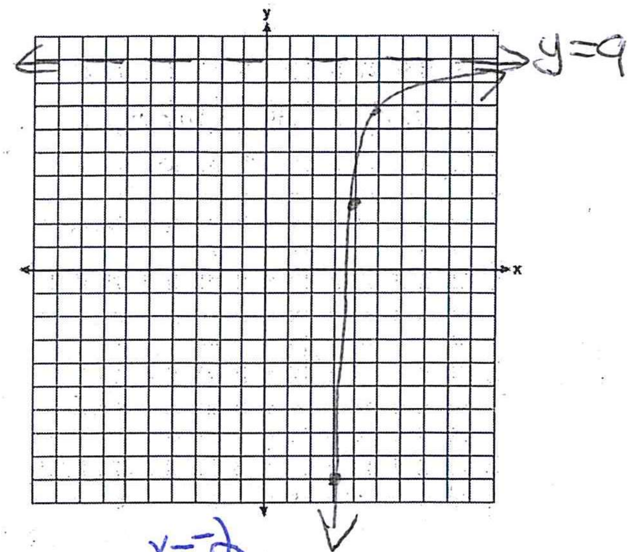
Domain: $(-\infty, \infty)$

Range: $(-\infty, 9)$

Asymptote: $y = 9$

End Behavior:
$x \to -\infty,\ f(x) \to -\infty$
$x \to \infty,\ f(x) \to 9$

x	y
3	-9
4	3
5	7



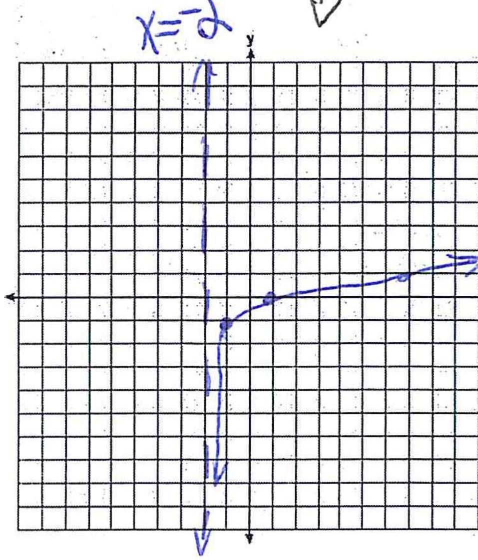
15. $y = \log_3(x+2) - 1$
Domain: $(-2, \infty)$

Range: $(-\infty, \infty)$

Asymptote: $x = -2$

End Behavior:
$x \to -2,\ f(x) \to -\infty$
$x \to \infty,\ f(x) \to \infty$

x	y
-2	ERROR
-1	-1
1	0
7	1



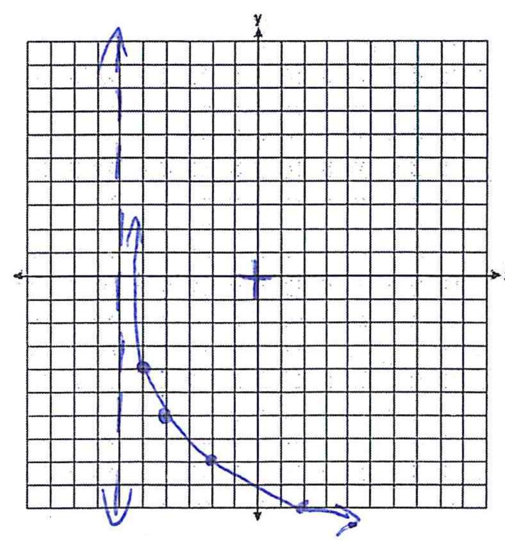
16. $y = -2\log_2(x+6) - 4$
Domain: $(-6, \infty)$

Range: $(-\infty, \infty)$

Asymptote: $x = -6$

End Behavior:
$x \to -6,\ f(x) \to \infty$
$x \to \infty,\ f(x) \to -\infty$

x	y
-6	ERROR
-5	-4
-4	-6
-2	-8
2	-10



Express the following in simplest form with a rational exponent

17. $\dfrac{\sqrt[3]{x^2} \bullet \sqrt[2]{x^5}}{\sqrt[6]{x^1}}$

$\frac{2}{3}+\frac{5}{2}=\frac{19}{6}$ $\quad \dfrac{x^{\frac{2}{3}} \cdot x^{\frac{5}{2}}}{x^{\frac{1}{6}}} \quad \dfrac{x^{\frac{19}{6}}}{x^{\frac{1}{6}}} \quad x^3$

$\frac{19}{6}-\frac{1}{6}=3$

18. $\dfrac{x\sqrt[2]{x^3}}{\sqrt[3]{x^5}}$ $\quad 1+\frac{3}{2}=\frac{5}{2}$

$\dfrac{x^1(x^{\frac{3}{2}})}{x^{\frac{5}{3}}}$ $\quad \frac{5}{2}-\frac{5}{3}=\frac{5}{6}$

$\dfrac{x^{\frac{5}{2}}}{x^{\frac{5}{3}}} = x^{\frac{5}{6}}$

- Radicals are Fractional exponents
- Get rid of Parenthesis
- Negative exponents are fractions
- Clean it up: multiply, Divide, reduce, evaluate

Express the following in radical form

19. $\dfrac{2x^{\frac{3}{2}}}{(16x^4)^{\frac{1}{4}}}$ $\quad \dfrac{\cancel{2}x^{\frac{3}{2}}}{\cancel{2}x^1}$ $\quad \frac{3}{2}-1=\frac{1}{2}$

$\sqrt[4]{16}$ $\quad \dfrac{2x^{\frac{3}{2}}}{16^{\frac{1}{4}}x^1}$ $\quad x^{\frac{1}{2}}$

2 $\quad \sqrt[2]{x^1}$

20. $\dfrac{(x^2y^4)^{\frac{1}{3}}}{xy}$ $\quad \frac{2}{3}-1=-\frac{1}{3}$

$\dfrac{x^{\frac{2}{3}}y^{\frac{4}{3}}}{x^1y^1}$ $\quad \frac{4}{3}-1=\frac{1}{3}$

$x^{-\frac{1}{3}}y^{\frac{1}{3}}$ $\quad \dfrac{y^{\frac{1}{3}}}{x^{\frac{1}{3}}}$ $\quad \dfrac{\sqrt[3]{y}}{\sqrt[3]{x}}$

21. 200 grams of a radioactive substance decays according to the formula $a(t)=200(.094)^{2t}$ where $a(t)$ is the amount of the radioactive substance remaining after t years. To the nearest hundredth of a year, how long will it take until there are 50 grams remaining?

$a(t)=50$

$\dfrac{50}{200}=\dfrac{200(.094)^{2t}}{200}$

$\log .25 = \log .094^{2t}$

$\dfrac{\log .25}{2\log .094}=\dfrac{2t\log .094}{2\log .094}$

$.29 = t$

22. Juliette deposits \$2500 into a bank account where the balance of the account $b(t)$ after t years can be represented by $b(t) = 2500(1.075)^t$. To the nearest tenth of a year, how long will it take for Juliette's money to reach \$4000?

$b(t) = 4000$

$\frac{4000}{2500} = \frac{2500(1.075)^t}{2500}$

$\log \frac{8}{5} = \log 1.075^t$

$\frac{\log \frac{8}{5}}{\log 1.075} = \frac{t \log 1.075}{\log 1.075}$

$6.5 = t$

23. Empanadas are taken out of an oven when they reached a temperature of 168°F and put on the kitchen table at room temperature (68°F). After 8 minutes, the temperature of the empanadas is 125°F. The temperature of a cooled object can be given by the formula below:

surrounding initial T

$T = T_a + (T_0 - T_a)e^{-kt}$

T = the temperature of the object after t minutes 125

t = time in minutes 8

T_a = the surrounding temperature 68

T_0 = the initial temperature of the object 168

k = decay constant $= k$

$125 = 68 + (168 - 68)e^{-k(8)}$

$-68 \quad -68$

$\frac{57}{100} = \frac{100e^{-8k}}{100}$

$\ln \frac{57}{100} = \ln e^{-8k}$

$\frac{\ln \frac{57}{100}}{-8} = \frac{-8k \ln e}{-8}$

$.070 = k$

Algebraically determine the value of k, rounded to the *nearest thousandth*. Using your value of k, to the *nearest minute*, algebraically determine how long will it take for the empanadas to reach 100°F?

t T

$T = 100$

$t = t$

$T_a = 68$

$T_0 = 168$

$k = .070$

$100 = 68 + (168 - 68)e^{-.070t}$

$-68 \quad -68$

$\frac{32}{100} = \frac{100e^{-.070t}}{100}$

$\ln \frac{8}{25} = \ln e^{-.070t}$

$\frac{\ln \frac{8}{25}}{-.070} = \frac{-.070t \ln e}{-.070}$

$16 = t$

24. After sitting out of the refrigerator for a while, a turkey at room temperature (68°F) is placed into an oven at 8 a.m., when the oven temperature is 325°F. Newton's Law of Heating explains that the temperature of the turkey will increase proportionally to the difference between the temperature of the turkey and the temperature of the oven, as given by the formula below:

surrounding initial

$$T = T_a + (T_0 - T_a)e^{-kt}$$

T_a = the temperature surrounding the object $= 325$

T_0 = the initial temperature of the object $= 68$

t = the time in hours $= 2$

T = the temperature of the object after t hours $= 100$

k = decay constant $= k$

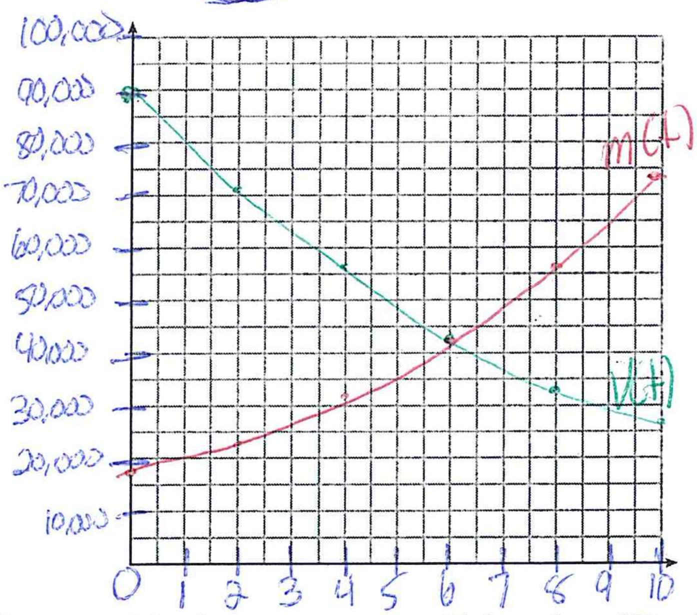
The turkey reaches the temperature of approximately 100° F after 2 hours. Algebraically determine the value of k, to the *nearest thousandth*. Using your value of k, algebraically determine how many hours after 8 a.m. the turkey will be 160°? to the nearest tenth.

$T_a = 325$
$T_0 = 68$
$t = t$
$T = 160$
$k = .066$

$100 = 325 + (68 - 325)e^{-k(2)}$
$-325 \quad -325$
$\frac{-225}{-257} = \frac{-257e^{-2k}}{-257}$
$\ln\frac{225}{257} = \ln e^{-2k}$
$\frac{\ln\frac{225}{257}}{-2} = \frac{-2k \ln e}{-2}$
$.066 = k$

$160 = 325 + (68 - 325)e^{-.066t}$
$-325 \quad -325$
$\frac{-165}{-257} = \frac{-257e^{-.066t}}{-257}$
$\ln\frac{165}{257} = \ln e^{-.066t}$
$\frac{\ln\frac{165}{257}}{-.066} = \frac{-.066t \ln e}{-.066}$
$6.7 = t$

25. The value of Tom's bank account is currently ~~100000~~ $ 90,000 and is decreasing according to the equation $V(t)=90000(.887)^t$. The amount of money he has paid for his mortgage can be represented by the equation $M(t)=18000(1.152)^t$. Graph and label $V(t)$ and $M(t)$ over the interval [0,10] no arrows



V(t)

x	y
0	90,000
2	70,809
4	55710
6	43831
8	34485
10	27132

M(t)

x	y
0	18,000
2	23888
4	31702
6	42071
8	55833
10	74096

V(t)=M(t) Intersect

After how many years will the value of Tom's bank account be equal to the amount of money he paid for his mortgage? Round your answer to the *nearest tenth of a year*. Tom will open a new bank account when the value of his account is $25,000. Algebraically determine after how many years, to the *nearest hundredth of a year*, will that happen?

$V(t)=25{,}000$

2nd Trace: intersect

$t = 6.2$ years

$V(t)=90{,}000(.887)^t$

$\frac{25{,}000}{90{,}000}=\frac{90{,}000(.887)^t}{90{,}000}$

$\cancel{25{,}000}\ \log\frac{5}{18}=\log .887^t$

$\frac{\log\frac{5}{18}}{\log .887}=\frac{t\log .887}{\log .887}$

$10.68=t$

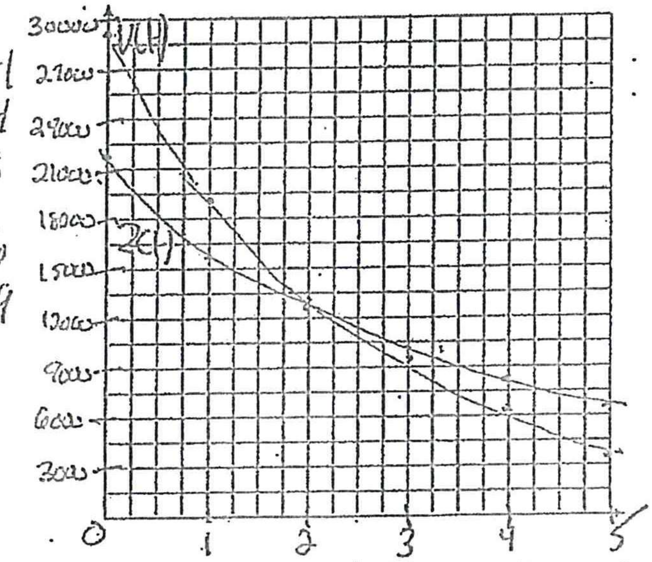
26. The value of a certain small passenger car based on its use in years is modeled by $V(t) = 28482.698(0.684)^t$, where $V(t)$ is the value in dollars and t is the time in years. Zach had to take out a loan to purchase the small passenger car. The function $Z(t) = 22151.327(0.778)^t$, where $Z(t)$ is measured in dollars, and t is the time in years, models the unpaid amount of Zach's loan over time. Graph $V(t)$ and $Z(t)$ over the interval $0 \leq t \leq 5$, on the set of axes below.

V(t)

X	y
0	28483
1	19482
2	13326
3	9114.8
4	6237.6
5	4264.4

Z(t)

X	y
0	22151
1	17234
2	13408
3	10431
4	8115.6
5	6313.9



Scale

$x \geq \frac{5}{20}$ $\quad y \geq \frac{28483}{20}$

$x \geq .25$ $\quad y \geq \cancel{1424.15}$

$y = 1500$

State when $V(t) = Z(t)$, to the *nearest hundredth*, and interpret its meaning in the context of the problem. Zach takes out an insurance policy that requires him to pay a \$3000 deductible in case of a collision. Zach will cancel the collision policy when the value of his car equals his deductible. To the *nearest year*, how long will it take Zach to cancel this policy? Justify your answer. $V(t) = 3000$

$t = 1.95$

After 1.95 years, the value of the loans will be the same (\$13569.29)

$V(t) = 28482.698(.684)^t$

$\frac{3000}{28482.698} = \frac{28482.698(.684)^t}{28482.698}$

$\cancel{Z(t) = 22151.327(0.778)^t}$

$3\cancel{000 = 22151.327}(0.778)^t$

$\cancel{22151.32}$

$\log .105... = \log .684^t$

$\frac{\log .105}{\log .684} = \frac{t \log .684}{\log .684}$

$6 = t$

48
13
36