1. Andrew invested $12,000 in an investment earning 6% compound interest compounded annually.

Year	Value of Investment ($)
0	12,000.00
1	12,720.00
2	13,483.20
3	14,292.19
4	15,149.72
5	16,058.71

a. Identify the independent and dependent variables.

Year

Value of investment

1. Andrew invested $12,000 in an investment earning 6% compound interest compounded annually.

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0	12,000.00
1	12,720.00
2	13,483.20
3	14,292.19
4	15,149.72
5	16,058.71

b. What are appropriate units for the rate of change?

$/year (dollars per year)

1. Andrew invested $12,000 in an investment earning 6% compound interest compounded annually.

Year	Value of Investment ($)
0	12,000.00
1	12,720.00
2	13,483.20
3	14,292.19
4	15,149.72
5	16,058.71

720, 763.2, 808.99, 857.53, 908.99

43.2, 45.79, 48.54, 51.46

ratios: 1.06, 1.06, 1.06, 1.06, 1.06

c. Calculate the first and second differences and determine whether the data in the table of values shows a linear, quadratic or exponential trend. Be sure to explain your decision.

nope first diffs not constant

nope second differences not constant

yep! ratios are constant

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1	12,720.00
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d. Under what circumstances would the differences have suggested each other type of trend?

linear if first differences constant

quadratic if second differences constant

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e. What is the rate of change, or percent increase of the investment each year.

rate of change ⇒ 1.06

This is a 6% increase

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f. Determine an equation to represent the value of this investment over time.

$Y = a \times b^X$ ← use t for time

initial value

use V for value of investment

rate of increase

$V = 12000 \times 1.06^t$

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g. Explain what each variable in your equation from part ~~e~~ f represents.

I already did in part f

1. Andrew invested $12,000 in an investment earning 6% compound interest compounded annually.

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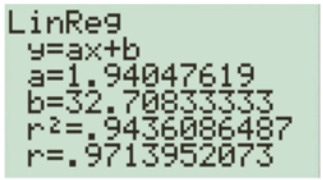
4	15,149.72
5	16,058.71

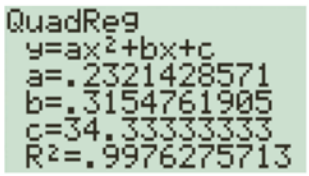
h. Determine the value of the investment after 30 years. Show your work.

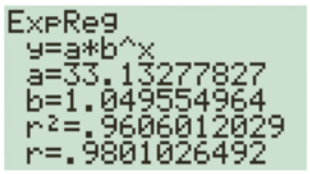
$V = 12000 \times 1.06^{30}$

$= \$68,921.89$

2. The screenshots below show the results of linear, quadratic and exponential regression analyses performed on data of the percent of Canadian homes with air conditioners over time. The initial year was 1999.







a. For each model, rewrite the equation with appropriate variables, identify the initial value, and identify the r^2 value and percent confidence.

Linear

$P = 1.94t + 32.71$ ← initial value

94.4%

Quadratic

$P = 0.23t^2 + 0.32t + 34.33$ ← initial value

99.8%

Exponential

$P = 33.13 \times 1.05^t$ ← initial value

96.1%

b. For each model, determine the expected percentage of Canadian homes with air conditioners in ~~1990 and 2020~~.

1990 → $t = -9$

2020 → $t = 11$

$P = 1.94t + 32.7$

$P = 1.94(-9) + 32.7 = 15.25\%$ in 1999

$P = 1.94(21) + 32.7 = 73.45\%$ in 2020

$P = 0.23t^2 + 0.32t + 34.33$

$P = 0.23(-9)^2 + 0.32(-9) + 34.33 = 50.04\%$

$P = 0.23(21)^2 + 0.32(21) + 34.33 = 142.48\%$

$P = 33.13 \times 1.05^t$

$P = 33.13 \times 1.05^{(-9)} = 21.4\%$

$P = 33.13 \times 1.05^{(21)} = 92.3\%$

c. Which model do you think does the worst job at predicting into the past? Justify your choice.

Exponential... slowly approaches 0

d. Which model do you think does the best job at predicting into the future? Justify your choice.

Linear, the other two accelerate at an unrealistic rate.