7.1 Exponential Functions

To see if an exponential function is increasing or decreasing, graph the function and look at it from left to right.

Interest Formula:

Simplified Interest/Exponential Growth
$A = P(1 + r)^t$ for Increasing
$A = P(1 - r)^t$ for Decreasing
P = Principal or original amount of money/starting amount
r = interest rate, expressed as a decimal
t = time in years the money is in the account
A= final amount

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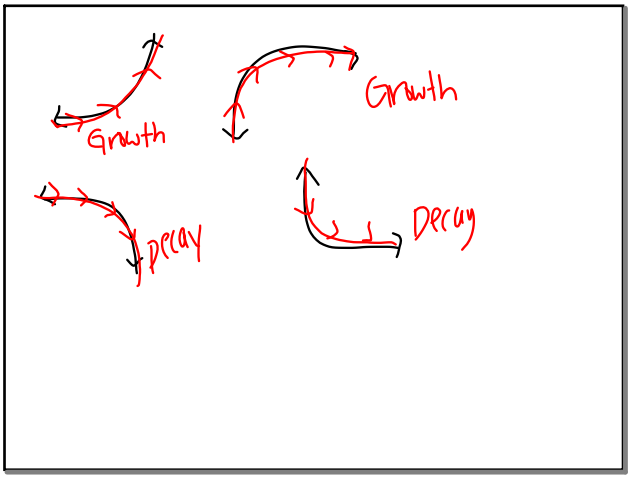

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Example: You purchase a new car for $14,850, but it decreases 4.75% per year. Answer the questions, round to two decimal places.

a) Write an exponential equation to model the value of the car after t years.

decreasing

$A = 14850(1-.0475)^t$

$A = 14850(.9525)^t$

.04,75

4.75/100

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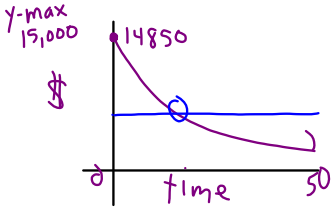
b) Graph the function. Label your axes and the x and y max from your window.



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c) Using your equation from part a, what will the value of the car be after 5 years?

2nd trace value

X=5

$11,642.64

$A=14850(.9525)^5$

$A=11,642.64$

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d) When will the car be worth $7,000?

$Y_1 = 14850(.9525)^x$

$Y_2 = 7000$

15.454

15.45 years

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Example: A piece of equipment costs $85,000 new, but increases 11% per year. Answer the questions, round to two decimal places.

a) Write an exponential equation to model the value of the equipment after t years.

$A = 85000(1+.11)^x$

$A = 85000(1.11)^x$

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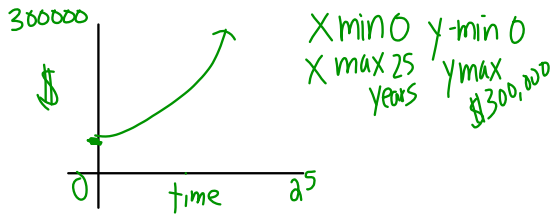
b) Graph the function. Label your axes and the x and y max from your window.



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c) Using your equation from part a, what will the value of the equipment be after 10 years?

$A = 85000(1.11)^{10}$

$241,350.78

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d) When will the equipment be worth $100,000?

y_2 100,000

1.56 years

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Example: Mr. Peterson wrote a check of $7820 to pay off a loan, which was given to him at a rate of 5% simple interest for 3 years. How much money did he borrow originally? Round to two decimal places.

$A = P(1+r)^t$

$\frac{7820}{(1+.05)^3} = \frac{P(1+.05)^3}{(1+.05)^3}$

$\frac{5}{100}$

$P = \$6755.21$

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Example: Jack deposited $1400 in his bank account. After 3 years, the account is worth $1694. Find the simple interest rate the account earned. Round to two decimal places.

$\frac{1694}{1400} = \frac{1400(1+r)^3}{1400}$

$\sqrt[3]{1.21} = \sqrt[3]{(1+r)^3}$

$1.0656 = 1+r$

$-1 \quad -1$

$.0656 = r$

$6.56\% = r$

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Review: $3x^2+3x=-8$ Quadratic formula

Solve:

$3x^2+3x+8=0$

$a=3 \quad b=3 \quad c=8$

$x=\frac{-3\pm\sqrt{(3)^2-4(3)(8)}}{2(3)}$

$x=\frac{-3\pm\sqrt{-87}}{6}$

$x=\frac{-3\pm i\sqrt{87}}{6}$

$87 = 3 \cdot 29$

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Transformations: $f(x)=a(x-h)^2+k$

a: Stretch/Shrink

h: left or right

k: up or down

negative: reflection

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Reminder of shapes of graphs:

Absolute Value: $f(x)=|x|$

Quadratic: $f(x)=x^2$

Square root: $f(x)=\sqrt{x}$

Cubic: $f(x)=x^3$

Cube Root: $f(x)=\sqrt[3]{x}$

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(14) $49x^2+9$ Check your answer

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