

WARM - UPs (Formative tomorrow)**LEVEL 1:**

Suppose you invest \$1500 at an interest rate of 2.2% compounded continuously. How much will you have after 20 years?

Which formula will you use? How do you know this?

$$A = 1500 \cdot e^{(.022 \cdot 20)}$$

$$A = \$2329.06$$

Mar 16-7:35 AM

LEVEL 3:

A current population of a species of bird in the wild is 2,000. The population is increasing exponentially every year by 3.2%. How long until the current population doubles?

$$a = 2,000$$

$$\frac{4000}{2000} = \frac{2000}{2000} (1 + .032)^t$$

$$r = .032$$

$$2 = 1.032^t$$

$$t = ?$$

$$\frac{\log(2)}{\log(1.032)} = t$$

$$y = 4,000$$

$$t = 22.0 \text{ yrs.}$$

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D.5 - Day 4 - Expo/Log Apps and Models

The function $y = e^x$ has an inverse, the natural logarithmic function, $y = \log_e x$, or $y = \ln x$.

Same conversion rule:

$$e^b = a \longleftrightarrow \ln a = b$$

Don't overcomplicate this!!!

Same properties:

Product: $\ln a + \ln b = \ln ab$

think of it as base e!

Quotient: $\ln a - \ln b = \ln a/b$

Power: $p \ln a = \ln a^p$

Feb 29-7:57 AM

Ex.1 What is the solution of $12 = e^{x-2}$?

$$\ln(12) = \ln(e)^{x-2}$$

$$\ln(12) = x-2 \cdot \ln(e)$$

$$\ln(12) = x-2$$

+2 +2

$$x = 4.5$$

Key Fact!!!
 $\ln(e) = 1$

Ex.2 What is the solution of $\frac{600}{400} = \frac{400e^{.04t}}{400}$?

$$1.5 = e^{(.04t)}$$

$$\ln(1.5) = \ln(e)^{(.04t)}$$

$$\frac{\ln(1.5)}{.04} = \frac{.04t}{.04}$$

$$10.1 = t$$

Feb 29-8:12 AM

Ex. 3 Word Problem:

Sammy wants her investment of \$2,400 to double. She is investing into a savings account where the interest rate is 6.5% compounded continuously. How long should she leave her money in this account?

Use: $A = Pe^{rt}$ $\frac{4800}{2400} = \frac{2400}{2400} \cdot e^{(.065t)}$

$$A = 4800$$

$$P = 2400$$

$$r = .065$$

$$t = ?$$

$$2 = e^{(.065t)}$$

$$\ln(2) = \ln(e^{(.065t)})$$

$$\frac{\ln(2)}{.065} = \frac{.065t}{.065}$$

$$t = 10.7 \text{ yrs.}$$

May 18-9:02 AM

Ex. 4 Word Problem:

An initial investment of \$350 is worth \$420 after six years of continuous compounding. Find the annual interest rate.

Use: $A = Pe^{rt}$ $420 = 350 \cdot e^{(6r)}$

$$A = 420$$

$$P = 350$$

$$r = ?$$

$$t = 6$$

$$1.2 = e^{6r}$$

$$\frac{\ln(1.2)}{6} = r$$

$$r = 0.030$$

times 100

$$r = 3\%$$

Feb 29-8:14 AM