

Omit #6 Today  
HW: Finish Classwork,  
Check Key Online Before Class

Group Quiz Thursday

GHW#8 Due Friday

Dec 1-9:12 PM

Word Problem Mixture  
Classwork/Homework

$$A = Pe^{rt}$$

$$A = P \left( 1 + \frac{r}{n} \right)^{nt}$$

PreCalc  
Unit 4 Day 10 - Group Work

$$A = A_0 \left( \frac{1}{2} \right)^t$$

For each question, solve for the missing variable before using your calculator to evaluate.

1. Byron invests \$1000 at First Rate Savings where they offer an account with 4.4% APR compounded continuously. What would the balance in his account be after 4 years?

$$A = 1000e^{.044(4)}$$
$$A = \$1192.44$$



2. When Angelina was born, her grandparents deposited \$3000 into a college savings account pay 4% interest compounded continuously.
- a. Assuming there are no deposits or withdrawals from the account, what will the balance be after 10 years?

$$A = 3000 e^{.04(10)}$$

$$A = \$4475.47$$

- b. How long will it take the balance to reach at least \$10,000?

$$10000 = 3000 e^{.04t}$$

$$\frac{10}{3} = e^{.04t}$$

$$\frac{\ln \frac{10}{3}}{.04} = \frac{.04t}{.04}$$

$t \sim 30 \text{ years}$

- c. If her grandparents want her to have \$10000 after 18 years, how much would they need to invest?

$$10000 = P e^{.04(18)}$$

$$P = \frac{10000}{e^{.04(18)}}$$

$$P = \$4867.52$$

3. If interest is compounded quarterly, what annual rate must you receive if your investment of \$1500 is to grow to \$2100 in six years? (round to the nearest hundredth)



$$2100 = 1500 \left(1 + \frac{r}{4}\right)^{24}$$

$$1.4 = \left(1 + \frac{r}{4}\right)^{24}$$

$$4 \left( \sqrt[24]{1.4} - 1 \right) = r$$

$$r = 5.65\%$$

4. Mrs. Chapman invests \$8500 in a retirement account with a fixed annual interest rate of 7% compounded monthly. How long will it take for the balance to reach \$70000? (round to the nearest month)

$$70000 = 8500 \left(1 + \frac{.07}{12}\right)^{12t}$$

$$\frac{140}{17} = \underbrace{\left(1 + \frac{.07}{12}\right)^{12t}}_x$$

$$\log_x \frac{140}{17} = 12t$$

$$12t = 362 \text{ months}$$

$$\text{or } 30 \text{ years } \hat{=} 2 \text{ months}$$

5. What is the half-life of a radioactive isotope if a 500.0 gram sample decays to 62.5 grams in 24.3 hours?

$$62.5 = 500(.5)^{24.3/h}$$

$$.125 = .5^{24.3/h}$$

$$\log_{.5} .125 = \frac{24.3}{h}$$

$$h = \frac{24.3}{\log_{.5} .125}$$

$$h = 8.1 \text{ hours}$$

**Omit**

6. A super deadly strain of bacteria is causing the zombie population to double every 2 days. Currently, there are 25 zombies. After how many days will there be 25,600 zombies?

7. Flu is spreading exponentially at a school. The number of new flu patients can be modeled using the equation  $F = 10e^{.12d}$  where  $d$  represents the number of days since 10 students had the flu. How many days will it take for the number of new flu patients to equal 50?

$$50 = 10e^{.12d}$$

$$5 = e^{.12d}$$

$$\frac{\ln 5}{.12} = \frac{.12d}{.12}$$

$$d = 13.4 \text{ days}$$

8. Mr. Cuthbert deposits \$5000 into an account paying 4.3% interest compounded semi-annually. How long until he has \$8000 in the account?

$$8000 = 5000 \left(1 + \frac{.043}{2}\right)^{2t}$$

$$1.6 = 1.0215^{2t}$$

$$\frac{\log_{1.0215} 1.6}{2} = \frac{2t}{2}$$

$$t \sim 11 \text{ years}$$

9. Carbon-14 has been used to date the La Brea Tar Pits by testing remains of Saber Tooth Tigers. Carbon-14 has a half-life of 5,730 years. Scientifically it is assumed that the initial mass of Carbon-14 abundant in a saber tooth femur was 1 microgram. If the measurements indicate that the current mass of Carbon-14 in the femur is approximately 0.09 micrograms, how many years ago did the saber tooth die? (round to the nearest 10 years)

$$.09 = 1(.5)^{t/5730}$$

$$\log_{.5} .09 = \frac{t}{5730}$$

$$t = 5730 \log_{.5} .09$$

$$t \sim 19900 \text{ years}$$

19910 years (to nearest 10 years)

10. Mrs. Phelps has \$4000 she is going to invest in an account that compounds continuously. She plans to keep her money in the account for 15 years and would like it to be worth \$7500 when she takes it out. What interest rate will she need to receive? (round to the nearest tenth)

$$7500 = 4000e^{15r}$$

$$1.875 = e^{15r}$$

$$r \sim 4.2\%$$

$$\frac{\ln 1.875}{15} = \frac{15r}{15}$$

In 11 & 12, round to the nearest ten-thousandth.

11.  $4^{2x-1} = 5^{x+3}$

$$(2x-1)\log 4 = (x+3)\log 5$$

$$2x\log 4 - \log 4 = x\log 5 + 3\log 5$$

$$2x\log 4 - x\log 5 = 3\log 5 + \log 4$$

$$x(2\log 4 - \log 5) = 3\log 5 + \log 4$$

$$x = \frac{3\log 5 + \log 4}{2\log 4 - \log 5} \quad x = 5.3429$$

12.  $8^{x-1} = 7^{1-2x}$

$$(x-1)\log 8 = (1-2x)\log 7$$

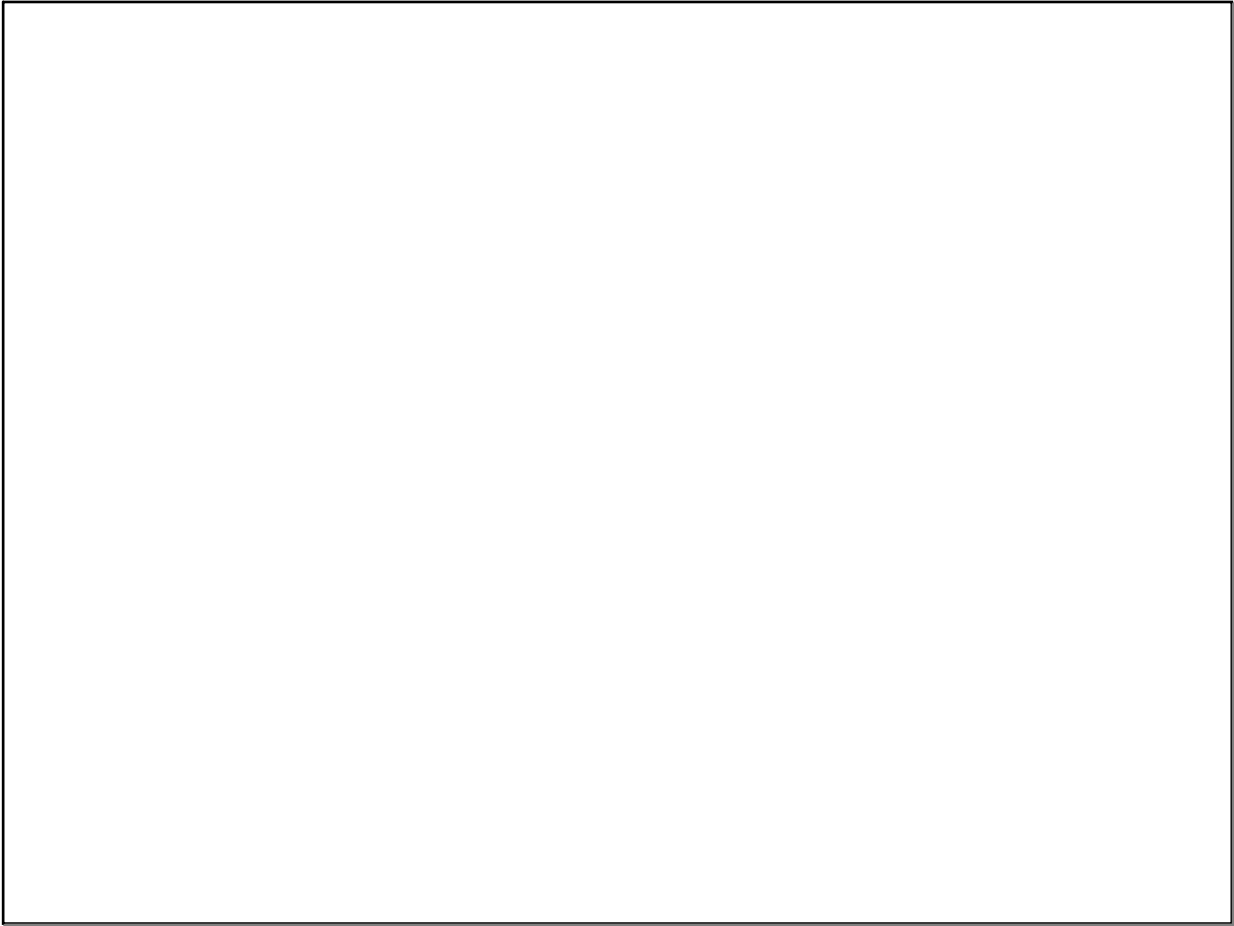
$$x\log 8 - \log 8 = \log 7 - 2x\log 7$$

$$x\log 8 + 2x\log 7 = \log 7 + \log 8$$

$$x(\log 8 + 2\log 7) = \log 7 + \log 8$$

$$x = \frac{\log 7 + \log 8}{\log 8 + 2\log 7}$$

$$x = .6741$$



Dec 1-9:25 PM