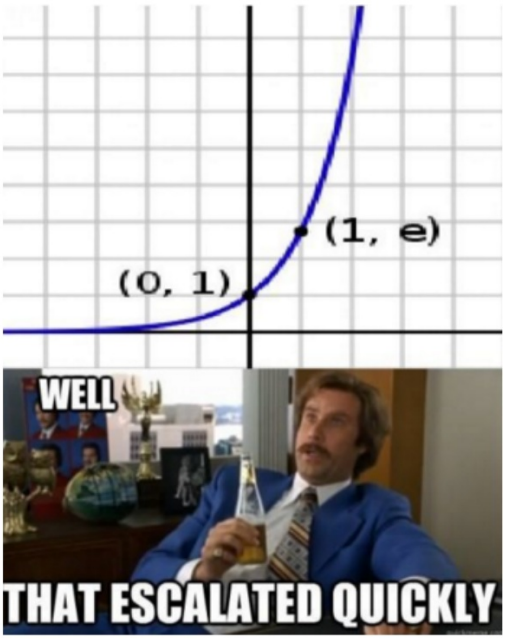
Exponential Word Problems



HW:
exp word prob
1, 2, 4

start Review (odd questions 1-39 odd)

Compound Interest

- Interest Compounded n times per year: $A = P\left(1 + \frac{r}{n}\right)^{nt}$

Where:

A=	P=	r=	n=	t=
accumulated amount (end)	principal (begin)	rate (as a decimal)	# times compounded	time (years)

	n
Annually	1
Quarterly	4
Monthly	12
Weekly	52
Daily	365
Semiannually	2

- Interest Compounded *continuously*: $A = Pe^{rt}$

Where:

A=	P=	r=	t=
Accumulated amount (end)	Principal (begin)	rate (as a decimal)	time (years)

1. (Round to the nearest hundredth) Find the total value of a $5,000 investment it is invested for 5 years at 7.2% interest compounded

a) monthly	b) daily	c) continuously
$A = ?$ $P = 5000$ $r = .072$ $n = 12$ $t = 5$	$A = 5000\left(1 + \frac{.072}{365}\right)^{365 \cdot 5}$	$A = 5000e^{.072 \cdot 5}$ ≈ 7166.65

$A = 5000\left(1 + \frac{.072}{12}\right)^{60}$

$A = 7166.39$

1825

2. (Round to the nearest hundredth) How long will it take for a $5,000 investment to be worth $12,000 if you invest at 8% compounded

a) continuously

$t = ?$

$A = Pe^{rt}$

$12000 = 5000e^{.08t}$

$\ln 2.4 = \ln e^{.08t}$

$\ln 2.4 = .08t$

$10.94 = t$

years

b) semi-annually

$12000 = 5000\left(1 + \frac{.08}{2}\right)^{2t}$

$\log 2.4 = \log(1.04)^{2t}$

$\log 2.4 = 2t \log 1.04$

$t = 11.16$ yrs.

3. ABC Bank is offering to double your money! They say that if you invest with them at 6% interest compounded continuously they will double your money. If you invest $1500 in the account, how long will it take to double your money? Round to two decimal places.

$$A = Pe^{rt}$$

$$3000 = 1500e^{.06t}$$

$$\ln 2 = \ln e^{.06t}$$

$$\frac{\ln 2}{.06} = \frac{.06t}{.06}$$

11.55yrs

4. (Round the interest rate to two decimal places) At what interest rate must you invest $20,000 if you want the account to be worth $30,000 in 3 years compounded

a) continuously	b) quarterly

5. At what interest rate must you invest if you want your money to double in 5 years compounded continuously? Round the interest rate to the nearest hundredth.

6. How much should you invest if you want the investment to be worth $20,000 after 10 years at 4.25% compounded monthly? Round to the nearest hundredth.

Review

Evaluate.

a) $\log_9 \frac{1}{27}$	b) $\ln\sqrt{e}$	c) $\log_{16} 4$

a) Expand $\log\left(\frac{xy^3}{100}\right)$	b) Solve $3^x - 1 = 15$	c) Solve $2\log_5 x = 4$