Compounded Interest & Exponential functions

2|19

An infectious disease begins to spread in a small city of population 10,000. After t days, the number of persons who have succumbed to the virus is modeled by the function:

$$v(t) = \frac{10,000}{5 + 1245e^{-0.97t}}$$

- How many infected people are there initially?

$V(t) = \frac{10,000}{(5+1245e^{-0.97(0)})}$ $t=0$ 8 people

- How many people are infected after five days?

$t=5$

$V(t) = \frac{10,000}{5+1245e^{-0.97(5)}}$

678 people

Compound Interest

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

P = Principal (beginning amt)
r = rate (as a decimal)
t = time in years
n = number of times it's compounded per year

Compounded:	**annually**	**n = 1**
	quarterly	**n = 4**
	monthly	**n = 12**
	daily	**n = 365**

Find the Final Amount:

$4000 at 3% compounded monthly for 15 years

3% = .03, monthly: n = 12

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

$$A = 4000\left(1 + \frac{.03}{12}\right)^{(12)(15)}$$

$$\$6,269.73$$

Find the Final Amount:

$8000 at 6.5% compounded quarterly for 8 years

$$A = 8000\left(1 + \frac{.065}{4}\right)^{(4)(8)}$$

$13,400.09

Find the Final Amount:

$600 at 9% compounded daily for 20 years

Find the Final Amount:

$300 at 6% compounded annually for 25 years

Compounded Continuously:

$$A(t) = Pe^{rt}$$

P = Principal
r = rate
t = time in years
e = 2.718281828…

Find the Final Amount:

$2500 at 4% compounded continuously for 25 years

$.04$

$A = Pe^{rt}$

$A = 2500\, e^{(.04)(25)}$

$\$6{,}795.70$

Suppose your are offered a job that lasts one month, and you are to be very well paid. Which of the following methods of payment is more profitable for you? How much will you make?

- One million dollars at the end of the month.

30 days

- Two cents on the first day of the month,
- 4 cents on the second day, 8 cents on the third day, and so on.

2^x $2^{30} =$

- Write an exponential equation to represent how many pennies you will have on any given day.

10,737,418.24