Exam 2: 3/25/15 (Wednesday)

Material: 1.6, 1.7, 1.8
2.1, 2.2, 2.3, 2.4, 2.6, 2.7
3.1, 3.2, 3.3, 5.4

This all covered in the Homework due Wednesday (3/25).
Nothing from Chapter 4.

$P = 2000$ t years
increases by 300% every 6 years

Percentage Rate of Change is the growth rate expressed as a percentage.
Given the 6-year growth rate is

$$r = 3$$

$$\left(r = \frac{f(x+1) - f(x)}{f(x)}\right)$$

Find the 6-year growth factor using the formula $a = 1 + r = 1 + 3 = 4$.

x as being 6-year periods

$$P(x) = 2000(4)^x$$

To get the yearly growth factor take the 6^{th} root

The yearly growth rate will be $b = 4^{1/6}$ (2) and the model in t years is

$$\boxed{P(t) = 2000\left(4^{1/6}\right)^t = 2000\,(4)^{t/6}}$$

Check that this agrees with the 6-year model

$$P(x) = 2000\,(4)^x$$

For instance, the model for years should agree when $t = 6$ and $x = 1$

$$P(t) = P(6) = 2000\,(4)^{6/6} = 2000 \cdot 4$$

$$P(x1) = P(1) = 2000\,(4)^1 = 2000 \cdot 4.$$

$C = 8$, increases at a rate of 19%

$$r = 19\% = \frac{19}{100} = .19$$

$$a = 1 + r = 1.19$$

$$P(t) = 8\,(1.19)^t \qquad P(t) = Ca^t$$

type A doubles every 20 minutes

type B quadruples every 30 minutes

Find 1 hour growth rate for each

Given growth factor $a = 2$ for type A and $b = 4$ for type B.

a - 20 minute growth factor

b - 30 minute growth factor

$P_A(t) = Ca^t$ where t indicates the number of 20 minute periods that have passed

Since there are 3 20-minute periods in each hour the 1-hour growth factor is (for type A)

$$a^3 = 2^3 = 8$$

~~h hours~~

$P_A(3) = Ca^3$ - 1 hour $\quad C(a^3) =$

$P_A(6) = Ca^6 = Ca^{2\cdot 3}$ - 2 hours $\quad C(a^3)^2$

$P_A(9) = Ca^9 = Ca^{3\cdot 3}$ - 3 hours $\quad C(a^3)^3$

$P_A(12) = Ca^{4\cdot 3}$ - 4 hours $\quad C(a^3)^4$

h hours

$P(h) = C(a^3)^h$

The 30-minute growth factor for type B is $b=4$. There are 2 30-min time periods in each hour, so the hourly growth factor for type B is

$$b^2 = 4^2 = 16.$$

For type A: growth factor (1 hour) is $a^3 = 8$

Know: $a = 1+r$, solve for r:

$$a - 1 = r$$

The rate for type A is (hourly)

$$a^3 - 1 = 8 - 1 = 7$$

The rate for type B is (hourly)

$$b^2 - 1 = 16 - 1 = 15.$$

$500 invested at 3%/year
Compounded quarterly
Find the investment after
1 year,
3 years,
6 years.

Compound Interest:

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

t - years
P - principal investment
n - # of compounding periods/year
r - interest rate (yearly)

$P = 500$
$r = 3\% = 3/100 = .03$
$n = 4$
$A(t) = (500)\left(1+\frac{.03}{4}\right)^{4t}$