

P = Principal or Present Value
 A = Accumulated Amount / future value } SAVINGS ACCOUNT

t = Time in years

m = Number of (compounding) Periods per yr.
 n = periods = mt

r = APR

i = Interest rate per period = $\frac{r}{m}$

R = Annuity Payment.

FV = Future Value of the annuity.

P does double-duty as present value of annuity or savings.

What's JG Wentworth pay for an annuity that pays \$500 per quarter, if the interest rate is 6.7% compounded quarterly,^{m=4} and the payments stretch over 30 years?

(Use this to determine the interest paid on a 30-yr mortgage, with same parameters.)

$$P = R \left(\frac{1 - \left(1 + \frac{r}{m}\right)^{-mt}}{\left(\frac{r}{m}\right)} \right) = \frac{Rm}{r} \left(1 - \left(1 + \frac{r}{m}\right)^{-mt} \right)$$

~~\$25,783.94~~

\$189,256.59

$$P = 500 \left(\frac{1 - \left(1 + \frac{.067}{4}\right)^{-(4)(30)}}{\left(\frac{.067}{4}\right)} \right)$$

$$\begin{aligned} &= \frac{500(4)(30)}{(2000)(30)} = \underline{60000} \\ &\text{with no interest.} \end{aligned}$$

≈ \$25,783.94

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2)^(12*18))/(.07
/12))
-129216.308
500*((1-(1+.067/
4)^(4*30))/(.06
7/4))
25783.94019
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25783.94019
Ans*(1+.067^(4*3
0))
25783.94019
25783.94*(1+.067
/4)^(4*30)
189256.5901
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Check SAVINGS

$$25,783.94 \left(1 + \frac{.067}{4} \right)^{4(30)} \approx \$189,256.59$$

Annuity

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^(4*30))/(.067/4
))
219107.3378
500*((1+.067/4)
^(4*30)-1)/(.067
/4))
189256.5916
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$$500 \left(\frac{\left(1 + \frac{.067}{4}\right)^{4(30)} - 1}{\frac{.067}{4}} \right) \approx \$189,256.59$$

This says that \$189,256.29 - \$60,000 = 129,256.29 was interest

$$\sum_{k=1}^{\infty} 3 \cdot 2^{k-1} = \text{~~A~~}$$

It grows without bound. $a_{k+1} = 2a_k$

$$\sum_{k=1}^{\infty} 3 \left(\frac{2}{5}\right)^{k-1} = 3 \left(\frac{1}{1-\frac{2}{5}}\right) = 3 \left(\frac{1}{\left(\frac{3}{5}\right)}\right) = 3 \left(\frac{5}{3}\right) = 5$$

$$C(n, k) = \binom{n}{k} = \text{"n choose k"} = \frac{n!}{(n-k)!k!}$$

$P(n, k)$ = Permutations on n things taken k at a time.

Beauty Contest with 50 contestants. How many ways can you choose Winner, 1st runner up and 2nd runner up.

$$P(50, 3) = \frac{50!}{(50-3)!} = \frac{50!}{47!} = 50 \cdot 49 \cdot 48 = 117,600$$

If we just want to know who the top 3 are, and don't care about order (1st/2nd/3rd), it's Combs:

$$C(50, 3) = \frac{50!}{(50-3)!3!} = \frac{50!}{47!3!} = \frac{50 \cdot 49 \cdot 48}{3 \cdot 2}$$

$$= 19,600 \text{ ways.}$$

