Geometric Series

$t_n = t_1 \cdot r^{n-1}$

$$S_n = \frac{t_1(r^n - 1)}{(r-1)} \qquad r \neq 1$$

$$S_n = \frac{r \cdot t_n - t_1}{r-1} \qquad r \neq 1$$

CH 1 

TEST

FRIDAY!!

$$S_n = \frac{t_1(r^n - 1)}{r - 1} \quad \text{or} \quad S_n = \frac{r t_n - t_1}{r - 1}$$

Ex 1 $4 + 12 + 36 + \ldots$ Find S_{10}

$t_1 = 4$

$r = 3$

$n = 10$

$\frac{12}{4} = 3$ ✓

$\frac{36}{12} = 3$

$$S_{10} = \frac{4(3^{10} - 1)}{(3 - 1)} = 118\,096$$

Ex 2 $\frac{1}{27} + \frac{1}{9} + \frac{1}{3} + \ldots + 729$

$t_1 = \frac{1}{27}$

$r = 3$

$t_n = 729$

$$S_n = \frac{r t_n - t_1}{r - 1}$$

$$S_n = \frac{3 \cdot 729 - \frac{1}{27}}{3 - 1}$$

$$\frac{\frac{27}{27} \cdot \frac{2187}{1} - \frac{1}{27}}{2}$$

$$\frac{\frac{59049}{27} - \frac{1}{27}}{2}$$

$$\frac{\frac{59048}{27}}{\frac{2}{1}}$$

Ta da!

$$\frac{59048}{27} \cdot \frac{1}{2} = \frac{29524}{27}$$

If $S_n = 33$, $t_n = 48$ and $r = -2$, what is t_1?

$$S_n = \frac{rt_n - t_1}{r-1}$$

$$33 = \frac{(-2)(48) - t_1}{-2-1}$$

$$-3 \cdot 33 = \frac{(-96 - t_1)}{-3} \cdot -3$$

$$-99 = -96 - t_1$$

$$+96 \quad +96$$

$$-3 = -t_1 \quad \text{so} \quad t_1 = 3$$