Skip 84 and 86

Find the sum of an Infinite Geometric Sequence.

If the absolute value of r is less than 1, then the geometric sequence has an infinite sum given by the formula:

$$\sum_{i=0}^{\infty} a_1 r^i \qquad S = \frac{a_1}{1-r}$$

If the absolute value of r is greater than or equal to 1, then the series does NOT have a sum.

Ex 1)

$a_1 = 4$

$r = 0.6$

$$\sum_{n=1}^{\infty} 4(.6)^{n-1} = S = \frac{4}{1-0.6} = \frac{4}{0.4} = \boxed{10}$$

Ex 2)

$$\sum_{n=0}^{\infty} 2(-2/3)^n$$

$r = -\frac{2}{3}$

$a_1 = 2$

$$S = \frac{2}{1 - -\frac{2}{3}} = \frac{2}{1\frac{2}{3}} = \frac{2}{1.6} = \boxed{1.2}$$

Repeating decimals.

$$S = \frac{a_1}{1-r}$$

Ex 3) Write .363636363...as a fraction.

$0.\overline{36} = 0.36 + 0.0036 + 0.000036 + \cdots$

$a_1 = 0.36$

$r = \frac{1}{100}$

$$\sum_{n=1}^{\infty} 0.36\left(\frac{1}{100}\right)^{n-1} = S = \frac{0.36}{1-\frac{1}{100}} = \frac{0.36 \cdot 100}{0.99 \cdot 100} = \frac{36 \div 9}{99 \div 9} = \boxed{\frac{4}{11}}$$

Story Problems

Ex 4) Please turn to page 583 and look at #77.

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

A.) $A = 1000\left(1+\frac{0.03}{1}\right)^{1\cdot 10} = \$1343.92$

B.) $A = 1000\left(1+\frac{0.03}{2}\right)^{2\cdot 10} = \$1346.86$

C.) $n = 4 \Rightarrow \$1348.35$

D.) $n = 12 \Rightarrow \$1349.35$

E.) $n = 365 \Rightarrow \$1349.84$

Ex 5) Please turn to page 583 and look at #79.

$$\sum_{n=1}^{60} 100\left(1+\frac{0.06}{12}\right)^n = \sum_{n=1}^{60} 100(1.005^n)$$

finite geometric series

$$S_n = a_1\left(\frac{1-r^n}{1-r}\right)$$

sum(seq(100(1.005^n), n, 1, 60))

= $7,011.89