

12) § 8.3 #5 9-21, 73-79.

As 9-16 Find common ratio

(9)  $4, 2, 1, \frac{1}{2}, \dots$

$$\frac{2}{4} = \frac{1}{2}, \frac{1}{2}, \frac{\frac{1}{2}}{1} = \boxed{\frac{1}{2} = r}$$

(11)  $10^2, 10^3, 10^4, \dots$

$$\frac{10^3}{10^2} = 10, \frac{10^4}{10^3} = \boxed{10 = r}$$

(3)  $-1, 2, -4, 8, \dots$

$$\frac{2}{-1} = -2, \frac{-4}{2} = \boxed{-2 = r}$$

(15)  $1, -1, 1, -1, \dots$

$$\boxed{r = -1}$$

#5 17-22 Write  $n^{\text{th}}$  term

(17)  $\frac{1}{6}, \frac{1}{3}, \frac{2}{3}, \frac{4}{3}, \dots$

$$\frac{\frac{2}{3}}{\frac{1}{6}} = \frac{1}{3} \cdot \frac{6}{1} = 2$$

$$\frac{\frac{4}{3}}{\frac{2}{3}} = \boxed{2 = r}$$

$$a = \frac{1}{6}$$

So, we have  $a_n = \boxed{\frac{1}{6}(2)^{n-1}}$

121 §8.3 #5 19, 21, 73-79

(19) .9, .09, .009, .0009

$$\frac{.09}{.9} = \frac{9}{90} = \frac{1}{10} = r$$

$$a = .9$$

$$a_n = .9 \left(\frac{1}{10}\right)^{n-1}$$

(21) 4, -12, 36, -108

$$-\frac{12}{4} = -3, \frac{36}{-12} = -3 = r$$

$$a = 4$$

$$a_n = 4(-3)^{n-1}$$

#s 73-79 Find the sum

(73)  $3 - 1 + \frac{1}{3} - \frac{1}{9} + \frac{1}{27} - \dots$

$$-\frac{1}{3} = -\frac{1}{3}, \frac{1}{3} = -\frac{1}{3}, \frac{1}{9} = -\frac{1}{9} \cdot \frac{3}{1} = -\frac{1}{3} = r$$

$$a = 3$$

$$\sum_n = a \left( \frac{r^n - 1}{r - 1} \right)$$

with the "n"  
$$= 3 \left( \frac{\left(\frac{1}{3}\right)^n - 1}{-\frac{1}{3} - 1} \right) \xrightarrow{n \rightarrow \infty} 3 \left( \frac{-1}{-\frac{4}{3}} \right)$$

$$= 3 \left( \frac{-1}{-\frac{4}{3}} \right) = 3 \left( \frac{3}{4} \right) = \frac{9}{4} = \sum_n$$

w/o the "n"  
after  $n \rightarrow \infty$

121 § 8.3 #s 75-79

(75)  $.9 + .09 + .009 + \dots$

$$\frac{.09}{.9} = .1 = \frac{1}{10} = r \quad \sum_n$$

$$a = .9 = \frac{9}{10}$$

$$S_n = \frac{a}{1-r} \left( \frac{1-r^{n+1}}{1-r} - 1 \right) = \frac{9}{10} \left( \frac{\left(\frac{1}{10}\right)^{n+1} - 1}{-\frac{9}{10}} \right) \xrightarrow{n \rightarrow \infty} \frac{9}{10} \left( \frac{-1}{-\frac{9}{10}} \right)$$

$$= \left( \frac{9}{10} \right) \left( \frac{10}{9} \right) = \boxed{1} = S$$

(77)  $-9.9 + 3.3 - 1.1 + \dots$

$$\frac{3.3}{-9.9} = -\frac{1}{3}, \quad \frac{-1.1}{3.3} = -\frac{1}{3} = r$$

$$a = -9.9$$

$$S_n = -9.9 \left( \frac{-1}{-\frac{1}{3}-1} \right) = -9.9 \left( \frac{-1}{-\frac{4}{3}} \right) = -9.9 \left( \frac{3}{4} \right) = \boxed{7.425}$$

↑ Same

$$= -9.9 \left( \frac{3}{4} \right)$$
$$= -\left(9 + \frac{9}{10}\right) \left( \frac{3}{4} \right) = -\frac{99}{10} \left( \frac{3}{4} \right) = \boxed{-\frac{297}{40}}$$

121 § 8B # 79

(79)  $\sum_{k=1}^{\infty} 34(0.01)^k$  is trick question  
is the trick.

Need  $k-1$  up there for our  $a \left( \frac{-1}{r-1} \right)$  thing

$$\sum_{k=1}^{\infty} (34)(0.01)^k = \sum_{k=1}^{\infty} (34)(0.01)(0.01)^{k-1}$$

$$= \sum_{k=1}^{\infty} .34(0.01)^{k-1} = .34 \left( \frac{-1}{.01-1} \right) = .34 \left( \frac{-1}{-.99} \right)$$

$r = .01$   
 $a = .34$  is the trick

$$= \frac{.34}{-.99} = \boxed{\frac{34}{99} = .34\overline{34}}$$

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I missed assigning these types &

\*s 61-69

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\*s 53-66 Use  $S_n$  formula, check by long way

(61)  $1.5 - 3 + 6 - 12 + 24 - 48 + 96 - 192 = -127.5$

$a = 1.5, r = -2, n = 8$  terms

$$a \left( \frac{r^n - 1}{r - 1} \right) = 1.5 \left( \frac{(-2)^8 - 1}{-2 - 1} \right) = \frac{3}{2} \left( \frac{256 - 1}{-3} \right)$$

$$= \frac{3}{2} \left( \frac{-255}{-3} \right) = \boxed{-\frac{255}{2}} = -127.5$$

121 § 8.3 #3 63-69

63

$$\sum_{k=1}^{12} 2(1.05)^{k-1}$$

$a=2, r=1.05, n=12$

$$S_n = 2 \left( \frac{(1.05)^{12} - 1}{1.05 - 1} \right) \approx 2 \left( \frac{1.795856326 - 1}{.05} \right)$$

$$= 2 \left( \frac{.795856326}{.05} \right) \approx 31.83425304$$

$$\approx 31.8343$$

$$2(1.05)^{1-1} + 2(1.05)^{2-1} + 2(1.05)^{3-1} + 2(1.05)^{4-1} +$$

$$+ 2(1.05)^{5-1} + 2(1.05)^{6-1} + 2(1.05)^{7-1} + 2(1.05)^{8-1}$$

$$+ 2(1.05)^{9-1} + 2(1.05)^{10-1} + 2(1.05)^{11-1} + 2(1.05)^{12-1}$$

$$\approx 31.8343$$

65

$$\sum_{k=0}^7 200(1.01)^k$$

$$= \sum_{k=1}^8 200(1.01)^{k-1}$$

Rectifying it to the form  $\sum_{k=1}^n ar^{k-1}$

$$= 200 \left( \frac{(1.01)^8 - 1}{1.01 - 1} \right) = 200 \left( \frac{(1.01)^8 - 1}{.01} \right) \approx 1657.134113$$

$$\approx 1657.1341$$

$$200 + 200(1.01) + 200(1.01)^2 + 200(1.01)^3 + 200(1.01)^4$$

$$+ 200(1.01)^5 + 200(1.01)^6 + 200(1.01)^7$$

$$\approx 1657.1341$$

121 58, 3 \* 567, 69

\* 567-72 write in  $\Sigma$ -notation

$$(67) 3^{-1} + \frac{1}{3} - \frac{1}{9} + \frac{1}{27}$$

$$a=3, r=-\frac{1}{3}$$

$$\frac{1}{27} = 3 \left(-\frac{1}{3}\right)^{n-1}$$

$$\frac{1}{81} = \left(-\frac{1}{3}\right)^{n-1}$$

$$\frac{1}{3^4} = \left(-\frac{1}{3}\right)^{n-1} = (-1)^{n-1} \left(\frac{1}{3}\right)^{n-1} = (-1)^{n-1} \left(\frac{1}{3^{n-1}}\right)$$

$$4 = n-1 \Rightarrow 5 = n$$

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

$$(69) .6 + .06 + .006 + \dots$$

$$a=.6, r=\frac{1}{10}$$

$$\sum_{k=1}^{\infty} (.6) \left(\frac{1}{10}\right)^{k-1}$$