

## Geometric Sequence

$$t_n = ar^{n-1}$$

## Geometric Series

$$S_n = \frac{a(r^n - 1)}{r - 1}$$

$$r \neq 0$$

Page 476 #1-5 (eco)

1a)  $1 + 24 + 8 + \dots$   
 $a=1, r=2$

$$S_{12} = \frac{(1)(2^{12} - 1)}{2 - 1}$$

$$S_{12} = 4095$$

1c)  $3 + 15 + 75 + \dots$   
 $a=3, r=5$

$$S_6 = \frac{3(5^6 - 1)}{5 - 1}$$
$$= \frac{3(15625 - 1)}{4}$$

$$S_6 = 11718$$

1e)  $3 - 6 + 12 - \dots$

$$a=3, r=-2$$

$$r = -2$$

$$S_9 = \frac{3((-2)^9 - 1)}{(-2) - 1}$$
$$= \frac{3(-512 - 1)}{-3}$$
$$= (-1)(-513)$$

$$S_9 = 513$$

Page 476 #1, 2a, 2c, 2e

1g)

$$972 + 324 + 108 + \dots$$

$$\boxed{a = 972}$$

$$r = \frac{324}{972} \Rightarrow$$

$$\boxed{r = \frac{1}{3}}$$

$$S_7 = \frac{972 \left( \left( \frac{1}{3} \right)^7 - 1 \right)}{\frac{1}{3} - 1}$$

$$= \frac{972 \left( \frac{1}{2187} - 1 \right)}{-\frac{2}{3}}$$

$$= 972 \left( \frac{-3}{2} \right) \left( \frac{-2186}{1287} \right)$$

$$\boxed{S_7 = \frac{4372}{3}}$$

$$\boxed{S_n = \frac{a(r^n - 1)}{r - 1}}$$

2a)  $a=5, r=3, n=8$

$$S_8 = \frac{5(-8 - 1)}{3 - 1}$$

$$\boxed{S_8 = 16400}$$

2e)  $a=100000, r=-0.1, n=5$

$$S_5 = \frac{100000((-0.1)^5 - 1)}{-0.1 - 1}$$

2c)  $a=625, r=0.6, n=5$

$$S_5 = \frac{625(0.6^5 - 1)}{0.6 - 1}$$

$$\boxed{S_5 = 1441}$$

$$\boxed{S_5 = 67360}$$



Page 476 #3

3a)  $1+2+4+\dots+256$

$a=1, r=2 \quad \therefore t_n = (2)^{n-1}$

Let  $t_n = 256 \Rightarrow 256 = 1(2)^{n-1}$

$256 = 2^{n-1}$

$2^8 = 2^{n-1}$

$8 = n-1$

$9 = n$

Find  $S_9 = \frac{1(2^9-1)}{2-1}$

$= \frac{1(512-1)}{1}$

$S_9 = 511$

3c)  $2-4+8-\dots+512$

$r = \frac{-4}{2} \quad a=2 \quad \therefore t_n = 2(-2)^{n-1}$

$r = -2$

Let  $t_n = 512$

$= 2(-2)^{n-1}$

$\frac{512}{2} = \frac{2(-2)^{n-1}}{2}$

$256 = (-2)^{n-1}$

$2^8 = (-2)^{n-1}$

$8 = n-1$

$9 = n$

$S_9 = \frac{2((-2)^9-1)}{-2-1}$

$S_9 = 342$

$S_n = \frac{a(r^n-1)}{r-1}$

$t_n = ar^{n-1}$

Page 476 #3e,

3e  $729 + 243 + 81 + \dots + 1$

$$\boxed{a = 729}$$

$$r = \frac{243}{729}$$

$$t_n = 729 \left(\frac{1}{3}\right)^{n-1}$$

$$\boxed{r = \frac{1}{3}}$$

Let  $t_n = 1$

$$1 = 729 \left(\frac{1}{3}\right)^{n-1}$$

$$S_7 = \frac{729 \left(\left(\frac{1}{3}\right)^7 - 1\right)}{\frac{1}{3} - 1}$$

$$\frac{1}{729} = \left(\frac{1}{3}\right)^{n-1}$$

$$\boxed{S_7 = 1093}$$

$$\left(\frac{1}{3}\right)^6 = \left(\frac{1}{3}\right)^{n-1}$$

$$6 = n - 1$$

$$\boxed{7 = n}$$

4.

$$f(1) = 0.8$$

$$f(2) = 1.6$$

$$r = \frac{1.6}{0.8}$$

$$\boxed{a = 0.8}$$

$$\boxed{r = 2}$$

$$S_{10} = \frac{(0.8) \left( (2)^{10} - 1 \right)}{2 - 1}$$

$$\boxed{S_{10} = 818 \frac{2}{5}}$$



476 #5

5

$$f(1) = 2$$

$$f(2) = -8$$

$$r = \frac{-8}{2}$$

$$\boxed{a=2}$$

$$\boxed{r=-4}$$

$$S_{15} = \frac{2((-4)^{15} - 1)}{-4 - 1}$$

$$S_{15} = 429\,496\,730$$