1)

a) $a_n = \frac{2^n - 1}{2^n}$

$n=1 \quad a_1 = \frac{2^1 - 1}{2^1} = \frac{1}{2}$

$n=2 \quad a_2 = \frac{2^2 - 1}{2^2} = \frac{3}{4}$

$n=3 \quad a_3 = \frac{2^3 - 1}{2^3} = \frac{7}{8}$

$n=4 \quad a_4 = \frac{2^4 - 1}{2^4} = \frac{15}{16}$

b) $a_n = \frac{1}{n!}$

$n=1 \quad a_1 = \frac{1}{1!} = 1$

$n=2 \quad a_2 = \frac{1}{2!} = \frac{1}{2}$

$n=3 \quad a_3 = \frac{1}{3!} = \frac{1}{6}$

$n=4 \quad a_4 = \frac{1}{4!} = \frac{1}{24}$

c) $a_n = \frac{(-1)^{n+1}}{2n-1}$

$n=1 \quad a_1 = \frac{(-1)^2}{2(1)-1} = \frac{1}{1} = 1$

$n=2 \quad a_2 = \frac{(-1)^3}{2(2)-1} = \frac{-1}{3}$

$n=3 \quad a_3 = \frac{(-1)^4}{2(3)-1} = \frac{1}{5}$

$n=4 \quad a_4 = \frac{(-1)^5}{2(4)-1} = \frac{-1}{7}$

d) $a_n = \frac{1-n}{n^2}$

$n=1 \quad a_1 = 0$

$n=2 \quad a_2 = \frac{1-2}{2^2} = \frac{-1}{4}$

$n=3 \quad a_3 = \frac{1-3}{3^2} = \frac{-2}{9}$

$n=4 \quad a_4 = \frac{1-4}{4^2} = \frac{-3}{16}$

2)

a) $1, -4, 9, -16, 25, \ldots$

vemos que

$1 = 1^2$
$4 = 2^2$
$9 = 3^2$
$16 = 4^2$
$\vdots$

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

b)

$\frac{1}{9}, \frac{2}{12}, \frac{2^2}{15}, \frac{2^3}{18}, \frac{2^4}{21}, \ldots$

arriba el numerador es $2^n$

el denominador va de 3 en 3 partiendo de 9

$a_n = \frac{2^{n-1}}{9 + 3(n-1)}$

3)

$5^{\circ}$ término es 15 $\rightarrow a_5 = 15$
$12^{\circ}$ término es 29 $\rightarrow a_{12} = 29$
es P.A.

tenemos que

$$a_5 = a_1 + (5-1)d$$
$$\boxed{a_5 = a_1 + 4d}$$

$$a_{12} = a_1 + (12-1)d$$
$$\boxed{a_{12} = a_1 + 11d}$$

la suma es 216

$$\frac{n}{2}\left(2a_1 + (n-1)d\right) = 216$$

$$a_5 + 7d = a_{12} = 29$$

$$a_5, a_6, a_7, a_8, a_9, a_{10}, a_{11}, a_{12}$$
$$1d \quad 1d \quad 1d \quad 1d \quad 1d \quad 1d \quad 1d$$
$$7d$$

$$a_5 + 7d = a_{12} = 29$$
como $a_5 = 15$
$$15 + 7d = 29$$
$$d = \frac{29-15}{7} = 2$$

entonces $d = 2$

$a_1 = 25 - 4d$

$a_1 = 15 - 4(2)$

$\boxed{a_1 = 7}$

cuantos terminos se necesitan para sumar 216

$$\frac{n}{2}(2a_1 + (n-1)d) = 216$$

$$\frac{n}{2}(2 \cdot 7 + (n-1)2) = 216.$$

$$\frac{n}{2}(14 + 2n - 2) = 216$$

$$\frac{n}{2}(2n + 12) = 216.$$

$$n(2n + 12) = 432$$

$$2n^2 + 12n - 432 = 0 \quad /1/2$$

$$n^2 + 6n - 216 = 0$$

$$n = \frac{-6 \pm \sqrt{6^2 + 4(1)(216)}}{2}$$

$$n = \frac{-6 \pm \sqrt{900}}{2}$$

$$n = \frac{-6 \pm 30}{2} \rightarrow \frac{-6+30}{2} = 12$$

$$\rightarrow \frac{-6-30}{2} = -18$$

$\boxed{n = 12}$

6)

$a_7 = 79$ P.A.

$a_{13} = 151$

$a_7 + 6d = a_{13}$

$$d = \frac{a_{13} - a_7}{6}$$

$$d = \frac{151 - 79}{6}$$

$$\boxed{d = 12}$$

$a_1 + 6d = a_7$

$a_1 = a_7 - 6d$

$a_1 = 79 - 6(12)$

$a_1 = 7$

progresión: $7, 19, 31, 43, \ldots$

7)

que valor de x hace que sea P.G

$$x,\ 2x+7,\ 10x-7.$$

$$\frac{2x+7}{x} = \frac{10x-7}{2x+7}$$

$$(2x+7)(2x+7) = (10x-7)x$$

$$(2x+7)^2 = 10x^2 - 7x$$

$$4x^2 + 28x + 49 = 10x^2 - 7x$$

$$-6x^2 + 35x + 49 = 0$$

$$x = \frac{-35 \pm \sqrt{35^2 - 4(-6)49}}{2(-6)}$$

$$x = \frac{-35 \pm \sqrt{2401}}{-12}$$

$$x = \frac{-35 \pm 49}{-12} \rightarrow \frac{-35+49}{-12} = -7/6$$

$$\rightarrow \frac{-35-49}{-12} = 7$$

x debe ser 7.

## 8.1

P.A.

$a_4 = 7$

$a_7 = 16$

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$a_4 + 3d = 16$

$d = \frac{16 - 7}{3}$

$\boxed{d = 3}$

$a_1 + 3d = 24$

$a_1 = 24 - 3d$

$a_1 = 7 - 3(3)$

$\boxed{a_1 = -2}$

**Le suma**

$S_{16} = \frac{16}{2}\left(2 \cdot (-2) + (16-1) \cdot 3\right)$

$\boxed{S_{16} = 328}$

8.2

P.G.

$a_1 = 3 \qquad a_4 = 24$

$a_1 r^3 = 24$

$r^3 = \frac{24}{a_1} = \frac{24}{3} = 8$

$r^3 = 8 \;/\sqrt[3]{}$

$\boxed{r = 2}$

la suma de los primeros 8.

$$S_8 = \frac{3(2^8 - 1)}{2 - 1}$$

$$S_8 = \frac{3(255)}{1}$$

$$S_8 = 765$$