① a) 1 2 3 ... año.

11000 11400 11800

2º año ⇒ 11400 $

3º año ⇒ 11800 $

ii) $a_n = a_1 + (n-1)\cdot d$

$a_n = 11000 + (n-1)\cdot 400$; $a_n = 11000 + 400n - 400$; $\boxed{a_n = 400n + 10600}$

$\boxed{a_{10} = 4000 + 10600 = 13600}$

$S_{10} = \frac{(11000 + 13600)\cdot 10}{2} = \boxed{123.000\ \$}$

Suma de los 10 años.

---

b) i) 1er year = 10.000

2º año = $10.000 \cdot 1'07 = \boxed{10700}$

3º año = $10.000 \cdot 1'07^2 = \boxed{11449}$

ii) $a_n = a_1 \cdot r^{n-1}$

$a_n = 10.000 \cdot 1'07^{n-1}$;

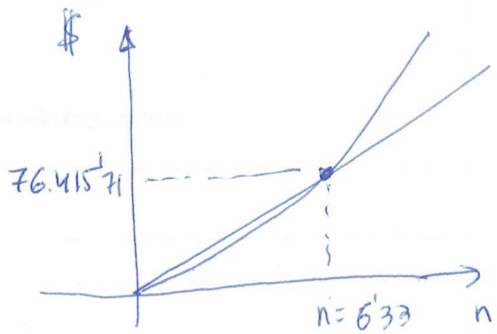
$a_{10} = 10.000 \cdot 1'07^9 = 18.384,59\ \$$ pagado el año 10.

---

c) Total earn by Bill $S_n = \frac{a_n \cdot r - a_1}{r-1} = \frac{a_1 \cdot r^n - a_1}{r-1} = \frac{10000 \cdot 1'07^n - 10000}{1'07-1}$

TOTAL earn by Arturo $S_n = \frac{(11.000 + 400n + 10600)\cdot n}{2} = \frac{(21600 + 400n)\cdot n}{2}$

Con calculadora gráfica:



intersecció de les 2 gràfiques entorn.

Deben pasar 7 años

(2) $i = 0'037$
$t = 21$
$180.000 = C_f$.

Capitalització:

$$180.000 = C_0 (1'037) \frac{(1'037)^{21} - 1}{0'037}$$

$$C_0 = \frac{180.000 \cdot 0'037}{1'0373 \cdot ((1'037)^{21} - 1)} = \boxed{5610'84 \text{ €}}$$

(2)

---

(3) a) Amortització

9000 €
$t = 4$
$i = 0'06$

$$9000 = C_0 \cdot \frac{(1'06)^4 - 1}{0'06 \cdot (1'06)^4}$$

$$\frac{9000 \cdot 0'06 \cdot (1'06)^4}{((1'06)^4 - 1)} = C_0$$

$$\boxed{C_0 = 2597,32 \text{ €}}$$

b) 9000 €
$t = 4$
$i = 0'052$

$$9000 = C_0 \cdot \frac{(1'052)^4 - 1}{0'052 \cdot (1'052)^4}$$

$$\boxed{C_0 = 2549'91}$$

(4) i) $r = \frac{270}{405} = \frac{a_2}{a_1} = \frac{2}{3}$

ii) $a_1 = 405$; $a_{15} = 405 \cdot \left(\frac{2}{3}\right)^{14} = 1'387322...$

$$S_{15} = \frac{405 \cdot r^{15} - 405}{\frac{2}{3} - 1} = \frac{405 \cdot \left(\frac{2}{3}\right)^{15} - 405}{-\frac{1}{3}} = \boxed{1212'23}$$

porque
- $S_1 = 405$
- $S_2 = 405 + 270 = 675$
- $S_3 = 405 + 270 + 180 = 855$
- ⋮
- $S_{15} = \boxed{1212'23}$

iii) Si $r \geq 0$ y $r < 1$ $\quad S_\infty = \frac{a_1}{1-r}$

$$S_\infty = \frac{405}{1 - \frac{2}{3}} = \frac{405}{\frac{1}{3}} = \boxed{1215}$$

---

(5) a/ $u_1 = 3$
$u_2 = 6$
$u_3 = 9$

b/ i) $\sum_{n=1}^{30} 3n = 3 + 6 + 9 \ldots$ prog. arit. $d = 3$, $a_1 = 3$

$a_n = 3 + (n-1) \cdot 3$

$a_{30} = 3 + 29 \cdot 3 = \boxed{90}$

$a_{100} = 3 + 99 \cdot 3 = \boxed{300}$

$a_{20} = 3 + 19 \cdot 3 = \boxed{60}$

$$\sum_{n=1}^{30} 3n = S_{30} = \frac{(a_1 + a_{30}) \cdot 30}{2} = \frac{(3 + 90) \cdot 30}{2} = \boxed{1395}$$

ii) $S_{100} = \frac{(3 + 300)\, 100}{2} = 15150$

$S_{20} = \frac{(3 + 60) \cdot 20}{2} = 630$

$$S_{100} - S_{20} = \sum_{n=21}^{100} 3n = 15150 - 630 = \boxed{14520}$$

(6) a) $\frac{3x-1}{4(x+3)} - \frac{x+2}{4(x-3)} = \frac{(3x-1)(x-3)}{4(x+3)(x-3)} - \frac{(x+2)(x+3)}{4(x-3)(x+3)} =$

$= \frac{3x^2-9x-x+3-x^2-3x+2x+6}{4(x+3)(x-3)} = \boxed{\frac{2x^2-15x-3}{4(x+3)(x-3)}}$

$2x^2-15x-3=0$

$x = \frac{15 \pm \sqrt{225+24}}{4} = \frac{15 \pm \sqrt{249}}{4}$ No solución entera para factorizar y simplificar

b) $\frac{2-x}{x(x-3)} - \frac{1}{4(x-3)} + \frac{5}{6(x-3)} = \frac{12(2-x)-3x+10x}{12x(x-3)} =$

$= \frac{24-12x-3x+10x}{12x(x-3)} = \boxed{\frac{-5x+24}{12x(x-3)}}$

c) $\frac{3x^2}{(x-2)(x+2)} + \frac{2}{x-2} + \frac{5x}{x+2} = \frac{3x^2+2(x+2)+5x(x-2)}{(x-2)(x+2)} =$

$= \frac{3x^2+2x+4+5x^2-10x}{(x-2)(x+2)} = \frac{8x^2-8x+4}{(x-2)(x+2)} = \boxed{\frac{2(4x^2-4x+1)}{(x-2)(x+2)}}$ (2·(4x²-...)

$8x^2-8x+4=0$

$2x^2-2x+1=0$

$x = \frac{2 \pm \sqrt{4-4}}{4}$ → No sol. reales

d) $\frac{1-x}{x+1} + \frac{x+1}{x-1} - \frac{2}{(x+1)(x-1)} = \frac{(1-x)(x-1)+(x+1)(x+1)-2}{(x+1)(x-1)} =$

$= \frac{x\cancel{1}-\cancel{x^2}+x+\cancel{x^2}+2x+\cancel{1}-2}{(x+1)(x-1)} = \frac{4x-2}{(x+1)(x-1)} = \boxed{\frac{2(2x-1)}{(x+1)(x-1)}}$

⑦ $P(-2) = 3\cdot(-2)^4 - m(-2)^2 + 2(-2) - 7 \Rightarrow 3$ por t. del resto.

$48 - 4m - 4 - 7 = 3$

$-4m = -34$

$\boxed{m = \frac{17}{2}}$

---

⑧ $2kx^2 - 4kx + 1 = f(x)$; $\Delta = (-4k)^2 - 4\cdot(2k)\cdot 1 \Rightarrow 0$ para 2 sol. iguales

$16k^2 - 8k = 0$

$8k\cdot(2k-1) = 0$ $\begin{cases} \boxed{k=0} \\ 2k-1=0 \end{cases}$

$\boxed{k = \frac{1}{2}}$

---

⑨ a) $x^2 + 6x - 1 = 3x^2 + 3x - 6$; $0 = 2x^2 - 3x - 5$; $x = \frac{3 \pm \sqrt{9+40}}{4}$ $\begin{cases} x_1 = \frac{5}{2} \\ x_2 = -1 \end{cases}$

b) $3x^3 + 5x^2 - 16x - 12 = 0$

Factorizado:

$3\cdot(x-2)(x+3)(3x+2) = 0$

Sol: $\boxed{x=2}$ $\boxed{x=-3}$ $\boxed{x=-\frac{2}{3}}$; $3x+2=0$, $x=-2/3$

	3	5	−16	−12
2		6	22	12
	3	11	6	0
−3		−9	−6	
	3	2	0	

c) $3x^4 - 30x^2 + 27 = 0$

$x^2 = t$,

$3t^2 - 30t + 27 = 0$ $\rightarrow$ $t = \frac{30 \pm \sqrt{900 - 4\cdot 3\cdot 27}}{6} = \frac{30 \pm 24}{6}$ $\begin{cases} t_1 = 9 \\ t_2 = 1 \end{cases}$

$x^2 = 9$ | $x^2 = 1$

$\boxed{x = \pm 3}$ | $\boxed{x = \pm 1}$

Sol: $x=3$, $x=-3$; $x=1$; $x=-1$

(9) cont

d) $\sqrt{2x+3} - \sqrt{x-2} = 2$;

$\left(\sqrt{2x+3}\right)^2 = \left(2+\sqrt{x-2}\right)^2$

$2x+3 = 4 + 4\sqrt{x-2} + x-2$

$(x+1)^2 = \left(4\sqrt{x-2}\right)^2$

$x^2+2x+1 = 16(x-2)$

$x^2-14x+33=0$

$x = \dfrac{14 \pm \sqrt{14^2-4\cdot 33}}{2} = \dfrac{14\pm 8}{2} = \begin{cases} x_1 = 11 \\ x_2 = 3 \end{cases}$

Comprovació en:

✓	Vàlides
✓	Vàlides

e) $\dfrac{1}{x-1} + 1 = \dfrac{x^2}{x^2+3x-4}$

$x^2+3x-4=0$

$x = \dfrac{-3\pm\sqrt{9+16}}{2} \begin{cases} x_1 = -4 \\ x_2 = 1 \end{cases}$

$\dfrac{1}{x-1} + 1 = \dfrac{x^2}{(x+4)(x-1)}$ m.c.m $(x+4)\cdot(x-1)$. multiplico els 2 bands.

$(x+4) + (x+4)(x-1) = x^2$

$x+4 + x^2 - x + 4x - 4 = x^2$

$4x = 0$

$\boxed{x=0}$

(10) a/ $(2b^2 - \frac{1}{b})^{12} = \dots + \dots + \dots + \dots$

$\binom{12}{r} \cdot (2b^2)^{12-r} \cdot \left(-\frac{1}{b}\right)^r \Rightarrow b^6$

$b^{24-2r} \cdot \frac{1}{b^r} = b^6$

$b^{24-2r-r} = b^6 \Rightarrow 24 - 3r = 6$

$18 = 3r$

$\boxed{6 = r}$

Luego:

el término completo es:

$\binom{12}{6}(2b^2)^6 \cdot \left(-\frac{1}{b}\right)^6 =$

$924 \cdot 64 \cdot b^{12} \cdot \left(\frac{-1}{b^6}\right) =$

$= \boxed{-59136\, b^6}$ Luego el coef. es $\boxed{-59.136}$

b/ 13 términos

---

(11) $(\sqrt{2} - 3)^5 =$ ~~$\binom{5}{0}(\sqrt{2})^5 + \binom{5}{1}(\sqrt{2})^4(-3) + \binom{5}{2}(\sqrt{2})^3(-3)^2 + \binom{5}{3}(\sqrt{2})^2(-3)^3 + \binom{5}{4}(\sqrt{2})^1(-3)^4 + \binom{5}{5}(-3)^5$~~

$\binom{5}{0}(\sqrt{2})^5 + \binom{5}{1}(\sqrt{2})^4(-3) + \binom{5}{2}(\sqrt{2})^3(-3)^2 + \binom{5}{3}(\sqrt{2})^2(-3)^3 +$

$+ \binom{5}{4}(\sqrt{2})^1(-3)^4 + \binom{5}{5}(\sqrt{2})^0(-3)^5 =$

$= 4\sqrt{2} + 5 \cdot 4 \cdot (-3) + 10 \cdot 2\sqrt{2} \cdot (-3)^2 + 10 \cdot 2 \cdot (-3)^3 + 5 \cdot \sqrt{2} \cdot (-3)^4 + (-3)^5 =$

$= 4\sqrt{2} + 60 + 180\sqrt{2} - 540 + 405\sqrt{2} - 243 =$

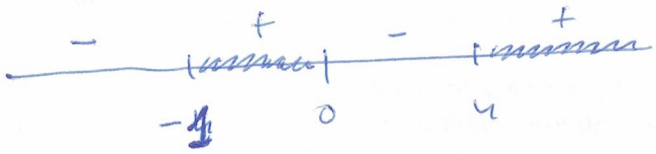
$= \boxed{589\sqrt{2} - 843}$

(12) $3x^2 - x^3 + 4x \geq 0$; $-x^3 + 3x^2 + 4x \geq 0$; $\boxed{x^3 - 3x^2 - 4x \leq 0}$ (9)

$x(x^2 - 3x - 4) = 0$ / $x = 0$ \ $x^2 - 3x - 4 = 0$

$x = \frac{3 \pm \sqrt{9+16}}{2} = \frac{3 \pm 5}{2}$ / $x_1 = 4$ \ $x_2 = -1$

$\boxed{x(x-4)(x+1) \leq 0}$



Sol: (-oo, -1]U[0, 4]

$x \in \mathbb{R} / \rightarrow \boxed{(-\infty, 0] \cup [4, \infty)}$

(13)

$\frac{2x-1}{3} - \frac{5x-5}{4} \leq \frac{1}{4}$; $\frac{\text{multiplo x 12}}{\text{los 2 lados}} \rightarrow 8x - 4 - 15x + 15 \leq 3$

$-7x \leq -8$ Divido por (-7)

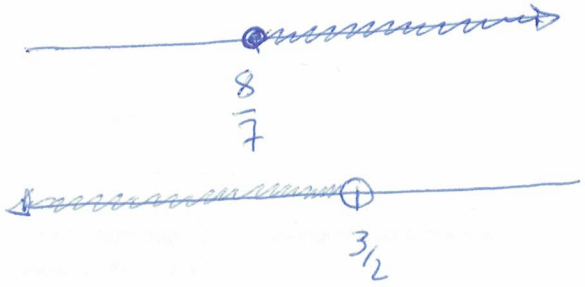
$\boxed{x \geq \frac{8}{7}}$

$-\frac{2x-6}{3} > -3$; multiplo por 3 los 2 lados:

$-2x - 6 > -9$

$3 > 2x$

$\frac{3}{2} > x \rightarrow \boxed{x < \frac{3}{2}}$



Solución: Zona común intersecci de (x) & Chum

Sol. $x \in \mathbb{R} / \rightarrow \boxed{\left[\frac{8}{7}, \frac{3}{2}\right)}$