

(1) A) a) y d) no son equivalentes por una es positiva y otra negativa.

b) $\frac{12}{60}, \frac{10}{25}$ $25 \cdot 12 = 300$ $9 \cdot 78 = 702$
 $60 \cdot 10 = 600$ $13 \cdot 54 = 702$

No son equivalentes si son equivalentes.

B) a) $\frac{2}{5}, \frac{-1}{3}, \frac{4}{9}, \frac{-2}{4}, \frac{3}{4}, \frac{4}{5}$
 $\frac{72}{180}, \frac{-60}{180}, \frac{80}{180}, \frac{-45}{180}, \frac{100}{180}, \frac{-135}{180}, \frac{144}{180}$

b) $-\frac{3}{4} < -\frac{2}{3} < -\frac{1}{3} < -\frac{1}{4} < \frac{2}{5} < \frac{4}{9} < \frac{5}{9} < \frac{4}{5}$
 $-\frac{3}{5}, \frac{2}{7}, -\frac{1}{3}, \frac{4}{5}, \frac{-5}{6}, \frac{3}{8}$
 $-\frac{504}{840}, \frac{240}{840}, \frac{-280}{840}, \frac{672}{840}, \frac{-700}{840}, \frac{315}{840}$
 $-\frac{5}{6} < -\frac{3}{5} < -\frac{1}{3} < -\frac{1}{4} < \frac{2}{7} < \frac{3}{8} < \frac{4}{9} < \frac{5}{9}$

(2) a) $356 - 227 = \frac{107}{30} - \frac{25}{11} = \frac{1177 - 750}{330} = \frac{427}{330}$

$100N = 356 \cdot 6$
 $-10N = 35 \cdot 6$
 $90N = 321 \Rightarrow N = \frac{321 \cdot 107}{90 \cdot 30}$

b) $25'8 - 47'16 = \frac{233}{9} - \frac{4245}{90} = \frac{2330 - 4245}{90} = -\frac{1915}{90} = \frac{-383}{18}$

$100N = 258 \cdot 8$
 $-10N = 25 \cdot 8$
 $90N = 233 \Rightarrow N = \frac{233}{9}$

c) $0'381 - \frac{346}{174} = \frac{21}{55} - \frac{173}{99} = \frac{21}{55} - \frac{99}{50} = \frac{210 - 1089}{550} = \frac{-879}{550}$

$1000N = 381 \cdot 81$
 $-10N = 3 \cdot 81$
 $990N = 378 \Rightarrow N = \frac{378}{990} = \frac{21}{55}$

$100N = 174 \cdot 74$
 $-10N = 174$
 $99N = 173 \Rightarrow N = \frac{173}{99}$

(3) a) $3'5 = \frac{32}{9}$; b) $2'15 = \frac{215}{100} = \frac{43}{20}$; c) $5'25 = \frac{473}{90}$
d) $0'75 = \frac{25}{99} = \frac{25}{81}$; e) $6'324 = \frac{5692}{900} = \frac{1423}{225}$

(4) $\frac{2}{3}$ de 90 = 60 $\rightarrow 60 \cdot 3 = 180 \text{€}$
 $\frac{1}{6}$ de $\frac{1}{3}$ de 90 = 5 $\rightarrow 5 \cdot 4 = 20 \text{€}$
 $90 - 65 = 25 \rightarrow 25 \cdot 2 = 50 \text{€}$
TOTAL = 250€

Hemos ganado 70€

(5) A) a) $4 \cdot 10^5$; b) $843 \cdot 10^4$; c) $5 \cdot 10^6$; d) $93 \cdot 10^{-4}$; e) $472 \cdot 10^{-3}$
B) $0'373 \cdot 10^{-1} \cdot 10^{-1} = 0'363 \cdot 10^{-1} = 3'63 \cdot 10^{-2}$
 $0'25 \cdot 10^{10} = 2'5 \cdot 10^9$; c) $170 \cdot 10^{-1} = 17 \cdot 10$

(6) a) $(\frac{5}{2})^{-3} = \frac{8}{125}$; b) $(-\frac{2}{3})^2 = \frac{4}{9}$; c) $2^2 \cdot (2 \cdot 2)^4 = 2^3 = 8$
d) $5^6 \cdot (-5)^5 = (-5)^6 \cdot (-5)^5 = (-5)^{11} = -5$
e) $(-7^5 \cdot 7^3) : 7^6 = -7^8 : 7^6 = -7^2 = -49$

f) $(3^4 \cdot 3^{12})^4 \cdot (3^3)^{30} = 3^{32} \cdot 3^{30} = 3^6 = 3 \cdot 3 = 3^2 = 1/9$
g) $2^{36} \cdot 2^{-15} : (2^8 \cdot 2^{18})^{-2} = 2^{21} : 2^{20} = 2^1 = 2$

(7) a) $138 \cdot 10^6 \cdot 10^{-18} = 138 \cdot 10^{24} = 138 \cdot 10^{-26}$ virus
b) $16 \cdot 10^{-8} \cdot 10^6 \cdot 24 \cdot 7 = 2688 \cdot 10^{-2} = 2688$ mm
c) $33 \cdot 10^5 \cdot 598 \cdot 10^{21} \cdot 10^3 = 19734 \cdot 10^{29} = 19734 \cdot 10^{30}$ kg

(8) $\frac{9}{11} = 0'81$ Periodico puro Periodo: 81
 $\frac{7}{8} = 0'875$ Decimal exacto Cent: 0'82; Miles: 0'818
 $\frac{101}{90} = 1'12$ Periodico mixto Cent: 0'88; Miles: 0'875
P: 2, A: 1
Cent: 1'12; Miles: 1'122

9) a) $\frac{1}{2} + \frac{1}{3} \cdot \frac{1}{2} = \frac{1}{2} + \frac{1}{6} = \frac{2}{3}$

Orveda $\frac{1}{3}$ que son $30m^2 \Rightarrow$ Total: $90m^2$

b) $\frac{3}{7} + \frac{1}{2} \cdot \frac{4}{7} = \frac{3}{7} + \frac{4}{14} = \frac{10}{14} = \frac{5}{7}$

c) $\frac{2}{5} + \frac{4}{6} \cdot \frac{2}{5} = \frac{2}{5} + \frac{8}{25} = \frac{23}{25}$

Orvedan $\frac{2}{25}$ que son $3l \Rightarrow$ Total: $3 \cdot \frac{25}{2} = \frac{375}{2} l$

d) $\frac{1}{3} + \frac{2}{5} \cdot \frac{2}{3} = \frac{1}{3} + \frac{4}{15} = \frac{9}{15} = \frac{3}{5}$

Orvedan $\frac{2}{5}$ que son $30 \in \Rightarrow$ Total: $30 \cdot \frac{5}{2} = \frac{75 \in}{2}$

25€ vestido, $\frac{4}{15} \cdot 75 = 20 \in$ suéter

10) a) -3; b) ± 2 ; c) $\pm x^4$; d) m^2 ; e) \neq ; f) ± 4

11) $13 = P(-2) = 3 \cdot (-2)^4 + 11 \cdot (-2)^3 + m \cdot (-2)^2 - 13 \cdot (-2) + 3 =$
 $= 48 - 88 + 4m + 26 + 3 = 4m - 11$

$13 = 4m - 11 \Rightarrow 4m = 24 \Rightarrow$ $m = 6$

12) a) $(\frac{1}{3})^5 = \frac{1}{243}$; b) $(-1)^3 = -1$; c) $\frac{5^3 \cdot 5^6}{5^2 \cdot 5^4} = 5^3 = 125$; d) $4 = 256$;

e) $\frac{3^{10}}{3^{43}} = 3^{-33} = \frac{1}{3^{33}}$; f) $(-10)^7 = -10.000.000$; g) $(-2)^{12} = -4096$;

h) $(-2)^{16} \cdot (-2)^3 = (-2)^{19} = -524.288$; i) $(-2)^{30} \cdot (-2)^{20} = (-2)^{50} = -1.125.891.264$;

j) $(-5)^3 \cdot 3 \cdot 3^{-3} = -3^5 = -243$; k) $\frac{5^2 \cdot 5^{-6}}{5^0 \cdot 5^5 \cdot 5^4} = 5^{-9} = \frac{1}{5^9} = \frac{1}{1.953.125}$; l) $2^{-8} = \frac{1}{256}$;

m) $7^{-4} = \frac{1}{2401}$; n) $2^0 = 1$; o) $(-3)^3 \cdot (-3)^4 \cdot (-3)^6 = (-3)^{13} = -1.594.323$

p) $(-2)^7 = -128$; q) $7^{-12} \cdot (-7^{10}) = -7^{-2} = -\frac{1}{49}$

13) a) $\frac{5}{12} : \frac{7}{24} - \frac{2}{3} = \frac{10}{24} - \frac{2}{3} = \frac{16}{24} = \frac{2}{3}$

b) $\frac{4}{5} : (\frac{3}{4} \cdot \frac{5}{6} - \frac{3}{8}) - 3 \cdot (\frac{1}{6} : \frac{3}{5}) = \frac{4}{5} : \frac{1}{4} - \frac{5}{6} = \frac{16}{5} - \frac{5}{6} = \frac{71}{30}$

c) $\frac{29}{7} - \frac{6}{5} : \frac{7}{20} = \frac{29}{7} - \frac{24}{7} = \frac{5}{7}$

d) $\frac{5}{6} - \frac{2}{3} + (\frac{2}{3} - \frac{4}{9}) : (\frac{16}{9} : 5) - \frac{1}{24} = \frac{5}{6} - \frac{2}{3} + \frac{2}{9} : \frac{16}{45} - \frac{1}{24} =$
 $= \frac{5}{6} - \frac{2}{3} + \frac{5}{8} - \frac{1}{24} = \frac{20-16+15-1}{24} = \frac{18}{24} = \frac{3}{4}$

e) $(\frac{2}{7} - \frac{-3}{20} : \frac{-7}{10}) : \frac{4}{14} = (\frac{2}{7} - \frac{3}{10}) : \frac{4}{14} = \frac{1}{14} : \frac{4}{14} = \frac{1}{4}$

f) $\frac{5}{6} \cdot (\frac{3}{5} - \frac{1}{12} : \frac{5}{12}) = \frac{5}{6} \cdot \frac{2}{5} = \frac{1}{3}$

g) $(-\frac{7}{12})^{-2} : (\frac{7}{24})^{-1} - \frac{5}{14} = \frac{144}{7} : \frac{24}{7} - \frac{5}{14} = \frac{6}{7} - \frac{5}{14} = \frac{1}{2}$

h) $-\frac{1}{9} : (\frac{4}{3} - \frac{25}{4} : \frac{10}{2}) + \frac{2}{5} = -\frac{1}{9} : (\frac{4}{3} - \frac{5}{4}) + \frac{2}{5} = -\frac{1}{9} : \frac{1}{12} + \frac{2}{5} =$
 $= -\frac{4}{3} + \frac{2}{5} = -\frac{14}{15}$

i) $(\frac{3}{4})^{-2} + (\frac{-4}{9})^{-1} \cdot \frac{12}{9} - \frac{1}{9} = \frac{16}{9} - \frac{9}{4} \cdot \frac{12}{9} - \frac{1}{9} = \frac{5}{9} - 3 = -\frac{4}{3}$

j) $\frac{1}{3} + \frac{1}{4} : \frac{7}{12} - \frac{3}{6} = \frac{1}{3} - \frac{3}{6} - \frac{1}{2} = -\frac{25}{12}$

k) $\frac{10}{3} + \frac{8}{12} = 4$; l) $\frac{10}{9} + \frac{13}{8} = \frac{199}{72}$; m) $\frac{9}{4} - \frac{7}{3} = -\frac{1}{12}$

n) $(\frac{3}{2} + \frac{2}{5}) \cdot \frac{5}{3} - [(\frac{1}{4} + \frac{2}{3}) \cdot \frac{3}{4} - \frac{1}{4} \cdot \frac{2}{3}] \cdot \frac{8}{5} =$
 $= \frac{19}{10} \cdot \frac{5}{3} - (\frac{11}{12} \cdot \frac{3}{4} - \frac{1}{6}) \cdot \frac{8}{5} = \frac{19}{6} - \frac{48}{5} \cdot \frac{8}{5} = \frac{19}{6} - \frac{5}{6} = \frac{14}{6} = \frac{7}{3}$

o) $\frac{1}{3} - \frac{1}{4} + \frac{1}{8} + \frac{3}{4} = \frac{23}{24}$

14) a) $-5x^3 - 5x^2 - 5x + 8x^3 + 28x^2 - 8 = 3x^3 + 23x^2 - 5x - 8$

b) $(9x^2 - 12x + 4)(-2x + 1) - 18x^3 + 12x^2 - 9x + 6 = -18x^3 + 24x^2 - 8x +$
 $+ 9x^2 - 12x + 4 - 18x^3 + 12x^2 - 9x + 6 = -36x^3 + 45x^2 - 29x + 10$

c) $(-5x^2 - 3x + 10x + 6)(2x - 4) - 3x^2 - 3x = -10x^3 + 14x^2 + 12x + 20x^2 -$
 $- 28x - 24 - 3x^2 - 3x = -10x^3 + 31x^2 - 19x - 24$

16) b)
$$\frac{x^5 - 2x^4 - x^5 + 3x^4 - 2x^3}{x^4 - 2x^3 + 4x^2 - x^4 + 3x^3 - 2x^2} = \frac{x^2 - 3x + 2}{x^3 + x^2 + x + 5}$$

17) a)
$$\frac{x^4 - 2x^3 + 4x^2 - x^4 + 3x^3 - 2x^2}{x^3 + 2x^2 - 5x - x^3 + 3x^2 - 2x} = \frac{5x^2 - 7x - 1}{-5x^2 + 15x - 10} = \frac{5x^2 - 7x - 1}{8x - 11}$$

18) a)
$$\frac{x^3 + x^2 + x + 5}{x^2 - 3x + 2} + \frac{8x - 11}{x^2 - 3x + 2} = \frac{x^3 + x^2 + x + 5 + 8x - 11}{x^2 - 3x + 2} = \frac{x^3 + x^2 + 9x - 6}{x^2 - 3x + 2}$$

19) a)
$$\frac{5x^2 - 10x + 3}{x^2 - 5x + 4} + \frac{20x - 16}{x^2 - 5x + 4} = \frac{5x^2 - 10x + 3 + 20x - 16}{x^2 - 5x + 4} = \frac{5x^2 + 10x - 13}{x^2 - 5x + 4}$$

20) a)
$$\frac{4x^3 + 2x^2 + x + 1}{6x^5 + 9x^4 - 6x^3 - 4x^2 - 6x + 4} + \frac{2x^3 - 2x^2 - 5x + 5}{6x^2 + 9x^7 - 10x^6 + 13x^4 - 6x^3} = \frac{4x^3 + 2x^2 + x + 1}{6x^5 + 9x^4 - 6x^3 - 4x^2 - 6x + 4} + \frac{2x^3 - 2x^2 - 5x + 5}{6x^2 + 9x^7 - 10x^6 + 13x^4 - 6x^3}$$

21)
$$\frac{-5x^4 + 7x^2 - 3x + 1}{-5x^4 + 22x^3 - 20x^2 + 14x - 6} + \frac{18x^3 - 28x^2 + 12x^2}{-5x^4 + 22x^3 - 20x^2 + 14x - 6} = \frac{-5x^4 + 7x^2 - 3x + 1 + 18x^3 - 28x^2 + 12x^2}{-5x^4 + 22x^3 - 20x^2 + 14x - 6} = \frac{-5x^4 + 18x^3 - 21x^2 - 3x + 1}{-5x^4 + 22x^3 - 20x^2 + 14x - 6}$$

22) a)
$$\frac{x - 3}{4(x - 3)} = \frac{x - 3}{4} \cdot \frac{1}{x - 3} = \frac{1}{4}$$

b)
$$\frac{2x - 5y}{2x + 5y} ; c) \frac{6(x^6 - 8x^3 + 16)}{2(x^6 - 16)} = \frac{6(x^6 - 8x^3 + 16)}{2(x^6 - 16)}$$

d)
$$\frac{2x^2(x^2 - 2xy + y^2)}{x^2(x^2 - y^2)} = \frac{2(x - y)}{x + y} ; e) \frac{18(x^2 - 1)^2}{9x^2(x - 1)^2} = \frac{18(x^2 - 1)^2}{9x^2(x - 1)^2} = \frac{2(x + 1)^2}{x^2}$$

d)
$$-20x^2 + 24x - 4 - 2x^3 + 6 + 7x^2 - 8x = -2x^3 + 13x^2 + 16x + 2$$

e)
$$-28x^2 + 35 + 8x - 10 + 6x^3 - 18x = 6x^3 - 28x^2 - 10x + 25$$

f)
$$-x^5 + x^4 - x^3 + x^2 + x$$

g)
$$(x^2 + 2x + 1)(x + 1) - x^3 - 1 - 3x^2 - 3 = x^3 + 2x^2 + x + x^2 + 2x + 1 - x^3 - 1 - 3x^2 - 3 = 3x - 3$$

h)
$$2x^3 + 3x^2 - 3x^2 - 2x^2 + 3 + x^2 - 2x = -x^2 - x + 1$$

i)
$$6x^4 - 4x^3 + 4x^2 - 9x + 6x - 6 - 4x^2 + 20x - 25 = 6x^4 - 4x^2 - 9x + 26x - 31$$

j)
$$4x^2 - 12x + 9 + 4x + 12x + 9 = 8x^2 + 18$$

k)
$$4x^4 + 12x^2y + 9y^4 - 4x^4 + 12x^2y - 9y^4 = 24x^2y^2$$

l)
$$4x^2 + 4x + 1 + 4x^2 + 8x + 4 + 4x^2 + 12x + 9 = 12x^2 + 24x + 14$$

15) a)
$$4y(-4y + 2y - 1) ; b) 12mn^2(3n^2 + 4m - mn) ; c) 5xy(2x - 3 + 4y) ; d) 4x^2(2x^3 - 4x - 1) ; e) 2a(a - 2b + 3c - 6bc) ; f) 4y^3(1 - 2y^2) ; g) 4x^2y(3y - 2x) ; h) 3a(a + 2b - 3c)$$

16) a)
$$\frac{4x^5 + 3x^3 - 4x^5}{-4x^5 + 4x^4 - 4x^3} = \frac{3x^3 - 2x}{-4x^5 + 4x^4 - 4x^3} = \frac{x^2 - x + 1}{4x^3 + 4x^2 + 3x - 1}$$

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

c)
$$\frac{3x^3 - 4x^2 - 2x}{-3x^3 + 3x^2 - 3x} = \frac{3x^3 - 4x^2 - 2x}{-3x^3 + 3x^2 - 3x} = \frac{x^2 - x + 1}{-6x + 1}$$

d)
$$\frac{1 - 5 + 0 + 7 + 3}{-1 + 6 - 6 - 1} = \frac{6}{-4} = -\frac{3}{2}$$

c(x) =
$$x^3 - 6x^2 + 6x + 1$$

f) $\frac{a(x+1)+2(x+1)}{a(2x+1)+2(2x+1)} = \frac{(a+2)(x+1)}{(a+2)(2x+1)} = \frac{x+1}{2x+1}$

23) a) $\frac{2x^5 - 8x^4 + 12x^3 - 2x^2 - x - 1}{-2x^5 + 6x^4 + 2x^3} = \frac{\sqrt{x^2 - 3x - 1}}{2x^3 - 2x^2 + 3x + 20}$

$$\begin{array}{r} -2x^4 + 14x^3 - 2x^2 \\ 2x^4 - 6x^3 - 2x^2 \\ \hline 8x^3 - 4x^2 + x \\ -8x^3 + 24x^2 + 8x \\ \hline 20x^2 + 9x - 1 \\ -20x^2 + 60x + 20 \\ \hline 69x + 19 \end{array}$$

24) a) $2x^4 - x^3 + x^2 - 2x$
 b) $\frac{6x^3 - 9x + 8 - 2x^2 + 2x - 4}{+2x^4 - 3x^3 + 2x - 3} = 2x^4 + 3x^3 - 2x^2 - 5x - 4$
 c) $\frac{2x^5 - 2x^4 + 4x^3 - 3x^2 + 3x^2 - 6x + x^2 - x + 2}{2x^5 - 2x^4 + 4x^3 - 3x^2 - 2x^2 + 3x + 4x^2 - 7x + 2} = 2x^5 - 2x^4 + x^3 - 6x^2 - 7x + 2$
 d) $\frac{2x^6 - 3x^5 + 2x^3 - 3x^2 - 2x^5 + 3x^4 - 2x^2 + 3x + 4x^4 - 6x^3 + 4x - 6}{= 2x^6 - 5x^5 + 7x^4 - 4x^3 - 5x^2 + 7x - 6}$

25) a) $\sqrt{2^4} = \sqrt{2^8} ; b) \sqrt{2^2 + 6\sqrt{2} - 12} = \sqrt{2} + \sqrt{2} - \sqrt{2} = \sqrt{2}$
 c) $\sqrt{2^2} \cdot \sqrt{2^3} = \sqrt{2^5} ; \sqrt{2^2} = \sqrt{2^3} = 4\sqrt{2} ; d) 2^2 = 4$
 e) $4\sqrt{3} + 15\sqrt{3} - 36\sqrt{3} + 6\sqrt{3} = -14\sqrt{3} ; f) 12\sqrt{2} + \frac{4}{3}\sqrt{2} - 3\sqrt{2} - 21\sqrt{2} = -\frac{32}{3}\sqrt{2}$
 g) $9 ; h) \sqrt[12]{2^3} \cdot \sqrt[12]{2^3} \cdot \sqrt[12]{2^3} = \sqrt[12]{2^9} = \sqrt[4]{2^3} = \sqrt[4]{8}$
 i) $\sqrt{a^3 b^2} = ba\sqrt{a}$; j) 180

26) $\sqrt[3]{3^4} ; \sqrt[4]{3^3} ; \sqrt[5]{3^4} \rightarrow \sqrt[60]{3^{80}} ; \sqrt[3]{3^{45}} ; \sqrt[60]{3^{48}} \rightarrow \sqrt{27} < (\sqrt[3]{9})^2 < \sqrt[3]{81}$

27) NO EXPLI GADO

28) a) $\sqrt[3]{405a^3b^7c^2}$; b) $\sqrt[3]{320a^6b^{11}c^6}$; c) $\sqrt[3]{290a^4b^{11}c^{14}}$
 b) $2\sqrt[3]{3} ; b) 2\sqrt[3]{4} ; c) 2\sqrt[6]{16} ; d) 9a^2c^3\sqrt{ab} ; e) 4a^2\sqrt[3]{2a^2b^2}$
 f) $16a^2b^3c^4\sqrt{ac}$

29) A) a) $\sqrt[3]{27} = 3 ; b) \sqrt[3]{28^3} = 28 ; c) \frac{1}{\sqrt[3]{9}} = \frac{1}{3} ; d) \frac{1}{\sqrt[5]{243}} = \frac{1}{3^2} = \frac{1}{9}$
 B) a) $3^{1/5} ; b) 3^{5/4} ; c) 5^{3/2} ; d) 5^{-1/6} ; e) 7^{-2/3}$

30) $a_7 = a_3 + 4d \Rightarrow -7 = 1 + 4d \Rightarrow d = -2$
 $a_3 = a_1 + 2d \Rightarrow 1 = a_1 - 4 \Rightarrow a_1 = 5$
 $S_{15} = \frac{15(a_1 + a_{15})}{2} = \frac{15(5 + 5 + 14 \cdot (-2))}{2} = -135$

31) P.a $a_1 = 1, d = 2$
 a) $a_{15} = a_1 + 14d = 1 + 14 \cdot 2 = 29$ ejercicios
 b) $S_{15} = \frac{15(a_1 + a_{15})}{2} = \frac{75(1 + 29)}{2} = 225$ ejercicios

32) $a_5 = 20 ; a_2 = 160$
 a) $a_5 = a_2 \cdot r^3 \Rightarrow 20 = 160r^3 \Rightarrow \frac{1}{8} = r^3 \Rightarrow r = \frac{1}{2} = 0.5$
 $a_2 = a_1 \cdot r \Rightarrow 160 = a_1 \cdot 0.5 \Rightarrow a_1 = 320$
 $S_{10} = \frac{a_1(r^{10} - 1)}{r - 1} = \frac{320(0.5^{10} - 1)}{0.5 - 1} = 639375$
 $P_{10} = (\sqrt{a_1 \cdot a_{10}})^{10} = (320 \cdot 320 \cdot 0.5^9)^5 = 32 \cdot 10^{11}$

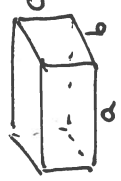
c) Si, Pq $r = 0.5 < 1$. $S = \frac{a_1}{1-r} = \frac{320}{1-0.5} = 640$

33) P.g. $a_1 = 10480 \text{€} , r = 0.5$
 a) $a_5 = a_1 \cdot r^4 = 10480 \cdot 0.5^4 = 655 \text{€}$
 b) $S_9 = \frac{a_1(r^9 - 1)}{r - 1} = \frac{10480(0.5^9 - 1)}{0.5 - 1} = 2079625 \text{€}$

34) A) a) $a_n = -n^2 ; b) a_n = \frac{1}{n} ; c) a_n = -n^3 ; d) a_n = \frac{2}{n^2}$
 B) 5, 7, 13, 31, 85

35) a) $a_n = 30 \cdot 4^{n-1} ; b) a_6 = 30 \cdot 4^5 = 30720$ moscos
 c) $a_n = 1 + (n-1) \cdot 0.03 = 0.03n + 0.97$ d) $a_{21} = 0.03 \cdot 21 + 0.97 = 1.6 \text{€}$
 e) $S_{30} = \frac{30(a_1 + a_{30})}{2} = 15 \cdot (1 + 1 + 29 \cdot 0.03) = 43.05 \text{€}$

(44)



$$V = abc = (x-3)(x+2)x = x^3 - x^2 - 6x$$

$$A = 2(ab + bc + ac) = 2[(x-3)(x+2) + (x+2)x + (x-3)x] = 2(x^2 - x - 6 + x^2 + 2x + x^2 - 3x) = 6x^2 - 4x - 12$$

(45)

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

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

No son equivalentes pq al simplificarlas no da lo mismo

(46)

$$(-5x^4 + 3x^2 - 2x + 1) + (2x^3 - 15x^2 + 3x - 3) + (4x^3 + 16x - 4) + (7 - 2x) =$$

$$(-3x^4 + 16x^3 - 12x^2 + 17x - 6) + (-21x^3 + 12x^2 - 84x^2 + 119x - 42) +$$

$$6x^5 - 32x^4 + 24x^3 - 34x^2 + 12x = 6x^5 - 53x^4 + 136x^3 - 118x^2 + 131x - 42$$

(47)

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

$$\begin{array}{r} 2 \quad 3 \quad 0 \quad -1 \\ -1 \quad -2 \quad -1 \quad 1 \\ \hline 1 \quad 2 \quad 1 \quad -1 \end{array}$$

$$x = \frac{-1 \pm \sqrt{1+8}}{4} = \frac{-1 \pm 3}{4} \rightarrow \frac{1}{2}$$

$$x^2 - 4x^2 + 5x - 2 = (x-1)^2(x-2)$$

(48)

$$\begin{array}{r} 1 \quad -4 \quad 5 \quad -2 \\ 1 \quad 1 \quad -3 \quad 2 \\ \hline 1 \quad -3 \quad 2 \quad 0 \end{array}$$

$$x^2 - 3x + 2 = (x-1)(x-2)$$

(49)

$$x^4 + x^3 - 7x^2 - x + 6 = (x-1)(x+1)(x-2)(x+3)$$

$$\begin{array}{r} 1 \quad 1 \quad -7 \quad -1 \quad 6 \\ 1 \quad 1 \quad 2 \quad -5 \quad -6 \\ \hline 1 \quad 2 \quad -5 \quad -6 \quad 0 \\ -1 \quad -1 \quad -1 \quad 6 \\ \hline 1 \quad 1 \quad -6 \quad 0 \end{array}$$

(50)

$$x^2 - x - 6 = (x-2)(x+3)$$

(51)

$$9x^2 - 36x + 26x^2 + 4x - 3 = (x-1)(x-3)(3x-1)(3x+1)$$

$$\begin{array}{r} 1 \quad 9 \quad -36 \quad 26 \quad 4 \quad -3 \\ 1 \quad 9 \quad -27 \quad -1 \quad 3 \\ \hline 3 \quad 0 \quad -27 \quad -1 \quad 3 \quad 0 \\ 1 \quad 9 \quad 0 \quad -1 \quad 0 \end{array}$$

(52)

$$9x^2 - 1 = (3x-1)(3x+1)$$

(36)

$$P(\frac{1}{2}) = 0 \Rightarrow 0 = (\frac{1}{2})^2 - 4(\frac{1}{2}) + k(\frac{1}{2}) + 1 = \frac{1}{8} - 1 - \frac{k}{2} + 1 \Rightarrow k = \frac{7}{4}$$

(37)

$$a_6 = 10^5, d = 1^5; a_6 = a_1 + 5d \Rightarrow 10^5 = a_1 + 5 \cdot 1^5 \Rightarrow a_1 = 2$$

$$a_n = 3 + (n-1)1^5 = 1^5n + 1^5; S_9 = \frac{9(a_1 + a_9)}{2} = \frac{9(2 + 8)}{2} = 81$$

(38)

YA HECHO

(39)

$$a_2 = 200, a_5 = 1^6; a_5 = a_2 r^3 \Rightarrow 1^6 = 200 r^3 \Rightarrow r = 0.2$$

$$a_2 = a_1 r \Rightarrow 200 = a_1 \cdot 0.2 \Rightarrow a_1 = 1000; a_n = 1000 \cdot 0.2^{n-1}$$

(40)

$$S_{10} = \frac{a_1(r^{10} - 1)}{r - 1} = \frac{1000(0.2^{10} - 1)}{0.2 - 1} = 1249.999.872$$

(41)

$$P_{10} = (\sqrt{a_1 \cdot a_{10}})^{10} = (1000 \cdot 1000 \cdot 0.2^9)^5 = 0.035184372$$

$$S = \frac{a_1}{1-r} = \frac{1000}{1-0.2} = 1250$$

(42)

$$\frac{1}{2} + \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{2} + \frac{1}{4} = \frac{3}{4}$$

$$\frac{11}{15} \cdot \frac{1}{4} = \frac{11}{60}$$

(43)

$$\frac{3}{4} + \frac{11}{60} = \frac{36}{60} + \frac{11}{60} = \frac{47}{60}$$

Queda $\frac{1}{15}$ que son 36 l \Rightarrow Total: 540 l

(44)

$$\left. \begin{array}{l} a_4 = 60 \\ a_3 + a_{11} = 90 \end{array} \right\} \Rightarrow \text{Total: } 540 \text{ l}$$

(45)

$$a_{11} + 3d = 60$$

$$a_1 + 2d + a_1 + 10d = 90 \Rightarrow 2a_1 + 12d = 90 \Rightarrow a_1 + 3d = 45$$

$$S_{20} = \frac{20(a_1 + a_{20})}{2} = 10(75 + 75 + 19 \cdot (-5)) = 550$$

(46)

$$-3d = 15 \Rightarrow d = -5$$

$$a_1 = 75$$

(47)

$$P.a \quad a_1 = 150 \quad d = 30$$

$$a) \quad a_{12} = a_1 + 11d = 150 + 11 \cdot 30 = 480 \text{ usuarios}$$

$$b) \quad S_{10} = \frac{10(a_1 + a_{10})}{2} = \frac{5(150 + 150 + 9 \cdot 30)}{2} = 2850 \text{ usuarios}$$

(48)

$$a_3 = 14, a_7 = 32; a_7 = a_3 + 4d \Rightarrow 32 = 14 + 4d \Rightarrow d = 4.5$$

$$a_3 = a_1 + 2d \Rightarrow 14 = a_1 + 2 \cdot 4.5 \Rightarrow a_1 = 5; S_{15} = \frac{15(a_1 + a_{15})}{2} = \frac{75(5 + 5 + 14 \cdot 4.5)}{2} = 547.5$$

e) $32x^5 - 162x = 2x(16x^4 - 81) = 2x(4x^2 + 9)(4x^2 - 9) = 2x(4x^2 + 9)(2x + 1)^2(2x - 3)$

f) $4x^4 + 4x^3 - 3x^2 - 4x - 1 = (x-1)(x+1)(2x+1)^2$

$$\begin{array}{r|rrrr} 1 & 4 & 4 & -3 & -4 & -1 \\ & & 4 & 8 & 5 & 1 \\ \hline & 1 & 8 & 5 & 1 & 0 \end{array}$$

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

48: $A \square + A \square = b \cdot a + \frac{(b+a)h}{2} = (3x+2) \cdot x + \frac{(3x+2+x-1) \cdot x}{2} = 3x^2 + 2x + \frac{4x^2 + x}{2} = 5x^2 + \frac{5x}{2}$

4: a) $x^3 + 3x^2 - x - 3 = (x-1)(x+1)(x+3)$

$$\begin{array}{r|rr} 1 & 1 & 3 & -1 & -3 \\ & & 1 & 4 & 3 \\ \hline & 1 & 4 & 3 & 0 \end{array}$$

$x^2 + 4x + 3 = (x+1)(x+3)$

b) $x^3 + 3x^2 - 9x - 27 = (x-3)(x+3)^2$

$$\begin{array}{r|rr} 1 & 1 & 3 & -9 & -27 \\ & & 3 & 18 & 27 \\ \hline & 1 & 6 & 9 & 0 \end{array}$$

$x^2 + 6x + 9 = (x+3)^2$

c) $x^4 + 4x^3 - 6x^2 - 36x - 27 = (x+1)(x-3)(x+3)^2$

$$\begin{array}{r|rr} -1 & 1 & 4 & -6 & -36 & -27 \\ & & -1 & -3 & 9 & 27 \\ \hline & 1 & 3 & -9 & -27 & 0 \end{array}$$

$x^2 + 6x + 9 = (x+3)^2$

d) $x^3 + 3x^2 - 4 = (x-1)(x+2)^2$

$$\begin{array}{r|rr} 1 & 1 & 3 & 0 & -4 \\ & & 1 & 4 & 4 \\ \hline & 1 & 4 & 4 & 0 \end{array}$$

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

e) $x^4 - 3x^3 - 3x^2 + 11x - 6 = (x-1)^2(x+2)(x-3)$

$$\begin{array}{r|rr} 1 & 1 & -3 & -3 & 11 & -6 \\ & & 1 & -2 & -5 & 6 \\ \hline & 1 & -2 & -5 & 6 & 0 \end{array}$$

$x^2 - x - 6 = (x+2)(x-3)$

$(x-1)(x-3)^2(x+1)(x-3)^2 = x^2 - 6x + 9 = (x-3)^2$

$$\begin{array}{r|rr} 1 & 1 & -6 & 9 \\ & & 1 & -15 & 9 \\ \hline & 1 & -15 & 9 & 0 \end{array}$$

h) $x^3 - 13x + 12 = (x-1)(x-3)(x+4)$

$$\begin{array}{r|rr} 1 & 1 & 0 & -13 & 12 \\ & & 1 & 1 & -12 \\ \hline & 1 & 1 & -12 & 0 \end{array}$$

$x^2 + x - 12 = \frac{-1 \pm \sqrt{1+48}}{2} = \frac{-1 \pm 7}{2} \in \{3, -4\}$

i) $x^3 - 2x^2 - 15x + 36 = (x-3)^2(x+4)$

$$\begin{array}{r|rr} 1 & 1 & -2 & -15 & 36 \\ & & 3 & 3 & -36 \\ \hline & 1 & 1 & -12 & 0 \end{array}$$

$x^2 + x - 12 = (x-3)(x+4)$

j) $x^4 + 4x^3 - 2x^2 - 12x + 9 = (x-1)^2(x+3)^2$

$$\begin{array}{r|rr} 1 & 1 & 4 & -2 & -12 & 9 \\ & & 1 & 5 & 3 & -9 \\ \hline & 1 & 5 & 3 & -9 & 0 \end{array}$$

$x^2 + 6x + 9 = (x+3)^2$

k) $x^3 + 7x^2 + 16x + 12 = (x+2)^2(x+3)$

$$\begin{array}{r|rr} 1 & 1 & 7 & 16 & 12 \\ & & 2 & -2 & -10 & -12 \\ \hline & 1 & 5 & 6 & 0 \end{array}$$

$x^2 + 5x + 6 = (x+2)(x+3)$

l) $x^3 + 4x^2 + x - 6 = (x-1)(x+2)(x+3)$

$$\begin{array}{r|rr} 1 & 1 & 4 & 1 & -6 \\ & & 1 & 5 & 6 \\ \hline & 1 & 5 & 6 & 0 \end{array}$$

$w) x^3 - 2x^2 - 5x + 6 = (x-1)(x+2)(x-3)$

$$\begin{array}{r|rr} 1 & 1 & -2 & -5 & 6 \\ & & 1 & -1 & -6 \\ \hline & 1 & -1 & -6 & 0 \end{array}$$

$x^2 - x - 6 = (x+2)(x-3)$

n) $x^3 - x^2 - 2x = x(x^2 - x - 2) = x(x+1)(x-2)$

ñ) $x^4 - 5x^3 + 3x^2 + 9x - 6 = x(x^3 - 5x^2 + 3x + 9) = x(x+1)(x-3)^2$

$$\begin{array}{r|rr} -1 & 1 & -5 & 3 & 9 \\ & & -1 & 6 & -9 \\ \hline & 1 & -6 & 9 & 0 \end{array}$$

$x^2 - 6x + 9 = (x-3)^2$

o) $x^3 + 5x^2 + 7x + 3 = (x+1)^2(x+3)$

$$\begin{array}{r|rr} -1 & 1 & 5 & 7 & 3 \\ & & -1 & -4 & -3 \\ \hline & 1 & 4 & 3 & 0 \end{array}$$

$x^2 + 4x + 3 = (x+1)(x+3)$