A1

A	x	2'7%
B	y	6'3%
	9000	

$x \geq 5000$

$x \geq 2y$

ⓐ $\text{Max } f(x,y) = 0'027x + 0'063y$

S.a (1) $x + y \leq 9000 \rightarrow$

x	y
0	9000
9000	0

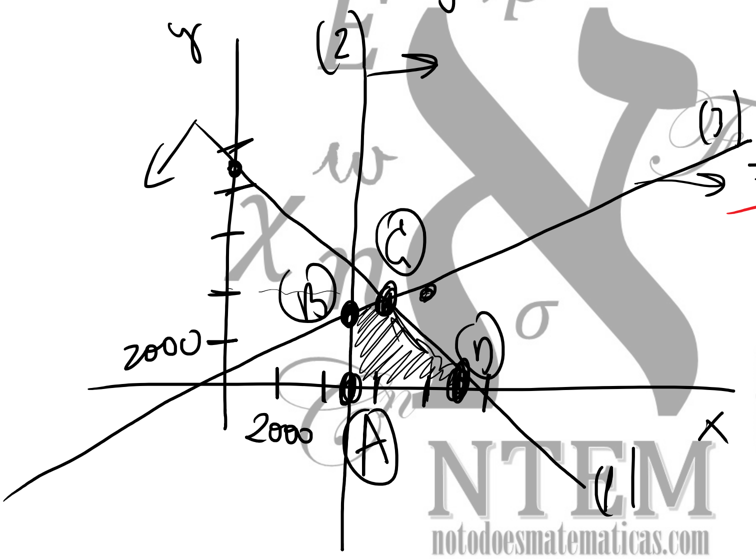
(2) $x \geq 5000$

(3) $x \geq 2y \rightarrow$

x	y
0	0
8000	4000

$y \geq 0$

$x + y = 9000$
$x = 2y$
$y = 3000$
$x = 6000$



	$f(x,y)$
$A(5000,0)$	135
~~$B(5000,2500)$~~	~~292'5~~
$C(6000,3000)$	351
$D(9000,0)$	243

Solución: ~~5000 €~~ $\rightarrow$ A 6000
~~2500 €~~ $\rightarrow$ B 3000

ⓑ Beneficio máximo de $\boxed{351\ €}$

A2

$f(x) = \dfrac{x^2}{2-x}$ $\qquad 2 - x = 0 \rightarrow x = 2$

ⓐ $\text{Dom } f = \mathbb{R} - \{2\}$

(a) $\text{Dom } f = \mathbb{R} - \{2\}$

Corte OX $(y=0)$ $\quad 0 = \dfrac{x^2}{2-x} \longleftrightarrow \boxed{x=0} \rightarrow \boxed{(0,0)}$

Corte OY $(x=0)$ $\quad y = \dfrac{0}{2} = 0 \rightarrow \boxed{(0,0)}$

(b) A.V. $\displaystyle\lim_{x \to 2} \frac{x^2}{2-x} = \frac{4}{0} = \infty$ $\quad \boxed{\text{A.V en } x=2}$

A.H. $\displaystyle\lim_{x \to \infty} \frac{x^2}{2-x} = \infty$ $\quad \boxed{\text{No tiene. A.H}}$

(c) $f'(x) = \dfrac{2x(2-x) - x^2 \cdot (-1)}{(2-x)^2} = \dfrac{4x - 2x^2 + x^2}{(2-x)^2} = \dfrac{4x - x^2}{(2-x)^2}$

$f'(x) = 0 \longleftrightarrow 4x - x^2 = 0 \rightarrow x(4-x) = 0$ $\nearrow \boxed{x=0}$ $\searrow \boxed{x=4}$

$$\begin{array}{c|ccccccc} f' & - & | & + & 0 & + & | & - \\ & \searrow & 0 & \nearrow & 2 & \nearrow & 4 & \searrow \end{array}$$

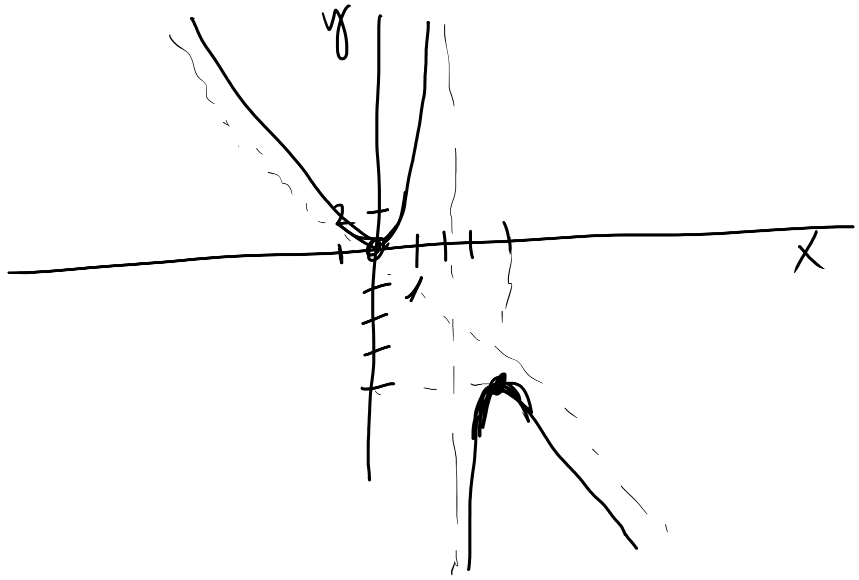
Crece: $(0,2) \cup (2,4)$

Decrece $(-\infty, 0) \cup (4, +\infty)$

(d) $f(0) = 0 \longrightarrow (0,0)$ mínimo

$f(4) = \dfrac{16}{-2} = -8 \longrightarrow (4,-8)$ máximo.

(e)



A3

S ≡ "smart TV"

P ≡ "pago"

$p(S) = 2/3$

$p(P/S) = 3/8$

$p(P) = 0'3$

	S	$\overline{S}$	
P	$1/4$	$0'05$	$0'3$
$\overline{P}$	$5/12$	$17/60$	$0'7$
	$2/3$	$1/3$	

$p(P/S) = \frac{p(P \cap S)}{P(S)} = 3/8$

$p(P \cap S) = \frac{3}{8} \cdot \frac{2}{3} = \frac{1}{4}$

(a) $p(\overline{S} \cap P) = 0'05$

(b) $p(S/P) = \frac{0'25}{0'3} = \frac{5}{6}$

(c) $p(\overline{S} / \overline{P}) = \frac{17/60}{0'7} = \frac{17}{42} \simeq 0'405$

$\boxed{B1}$ $A\begin{pmatrix} 3 & 1 \\ 1 & 1 \end{pmatrix}$ $B\begin{pmatrix} 0 & 2 \\ -1 & 2 \end{pmatrix}$

a) $(AB)^{-1}$

$$AB = \begin{pmatrix} 3 & 1 \\ 1 & 1 \end{pmatrix}\begin{pmatrix} 0 & 2 \\ -1 & 2 \end{pmatrix} = \begin{pmatrix} -1 & 8 \\ -1 & 4 \end{pmatrix}$$

$$|AB| = \begin{vmatrix} -1 & 8 \\ -1 & 4 \end{vmatrix} = -4+8 = 4 \neq 0 \rightarrow AB \text{ invertible}$$

$$(AB)^{-1} = \frac{1}{|AB|} \cdot \left(Adj(AB)\right)^t \qquad Adj\ AB = \begin{pmatrix} 4 & +1 \\ -8 & -1 \end{pmatrix}$$

$$\boxed{(AB)^{-1} = \begin{pmatrix} 1 & -2 \\ 1/4 & -1/4 \end{pmatrix}}$$

b) $AB^t - A^t B$

$$\begin{pmatrix} 3 & 1 \\ 1 & 1 \end{pmatrix}\begin{pmatrix} 0 & -1 \\ 2 & 2 \end{pmatrix} - \begin{pmatrix} 3 & 1 \\ 1 & 1 \end{pmatrix}\begin{pmatrix} 0 & 2 \\ -1 & 2 \end{pmatrix} =$$

$$= \begin{pmatrix} 2 & -1 \\ 2 & 1 \end{pmatrix} - \begin{pmatrix} -1 & 8 \\ -1 & 4 \end{pmatrix} = \boxed{\begin{pmatrix} 3 & -9 \\ 3 & -3 \end{pmatrix}}$$

c) $B^t \cdot X + A^t \cdot B = A^t$ $\qquad (A \cdot B^{-1})^t$

$$B^t \cdot X = A^t - A^t \cdot B = A^t (I - B)$$

$$X = \underbrace{(B^t)^{-1}} A^t (I - B)$$

$B^t \begin{pmatrix} 0 & -1 \\ 2 & 2 \end{pmatrix}$ $\quad |B^t| = 2 \quad (B^t)^{-1} = \frac{1}{2}\begin{pmatrix} 2 & 1 \\ -2 & 0 \end{pmatrix}$

$A^t \begin{pmatrix} 3 & 1 \\ 1 & 1 \end{pmatrix}$

$I - B = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} - \begin{pmatrix} 0 & 2 \\ -1 & 2 \end{pmatrix} = \begin{pmatrix} 1 & -2 \\ 1 & -1 \end{pmatrix}$

$$X = \frac{1}{2}\begin{pmatrix} 2 & 1 \\ -2 & 0 \end{pmatrix}\begin{pmatrix} 3 & 1 \\ 1 & 1 \end{pmatrix}\begin{pmatrix} 1 & -2 \\ 1 & -1 \end{pmatrix} =$$

$$= \frac{1}{2}\begin{pmatrix} 7 & 3 \\ -6 & -2 \end{pmatrix}\begin{pmatrix} 1 & -2 \\ 1 & -1 \end{pmatrix} = \boxed{\begin{pmatrix} 5 & -17/2 \\ -4 & 7 \end{pmatrix}}$$

$\boxed{B2}$ $\quad f(t) = t^3 - 8t^2 + 15t \qquad t \in [0, 6]$

ⓐ $t^3 - 8t^2 + 15t = 0 \qquad t(t^2 - 8t + 15) = 0$

$t = 0 \qquad t = 3 \qquad t = 5$

f: $[0,3]$: $+$; $[3,5]$: $-$; $[5,6]$: $+$

Benefizio $(0, 3) \cup (5, 6)$

Beneficio $(0,3)\cup(5,6)$

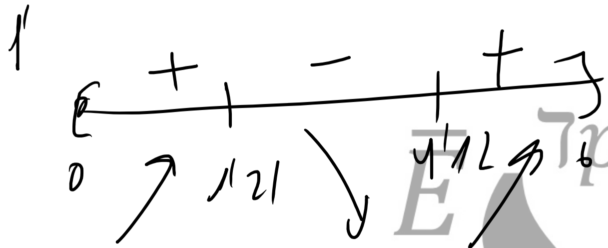
Pérdidas $(3,5)$

(b) $f'(t) = 3t^2 - 16t + 15$

$f'(t) = 0 \iff t = \dfrac{16 \pm \sqrt{16^2 - 4\cdot 3\cdot 15}}{6} = \dfrac{16 \pm 8'72}{6} =$

$= 4'12$ años $\rightarrow f(4'12) = -4'06$

$= 1'21$ años $\rightarrow f(1'21) = 9'886$



$f(0) = 0$

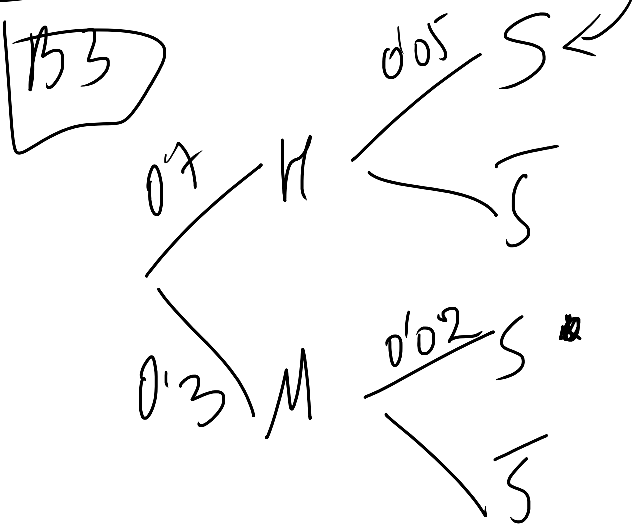
$f(6) = 18$

Máximo a los ~~1'21~~ 6 años : ~~9'886~~ 180 mil €

(c) Mínimo a los 4'12 años : 40'6 mil € (pérdida)

(d) No porque f es creciente en $(4'12, +\infty)$

B3



(a) $p = 0'7\cdot 0'05 + 0'3\cdot 0'02 =$

$= 0'041$

(b) $p(M|S) = \dfrac{0'3\cdot 0'02}{0'041} =$

$= \boxed{0'146}$

c) $p(H \cap S) = 0'7 \cdot 0'05 = 0'035$

$= 3'5\ \%$